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THE OLD FLYING DAYS

THE
OLD FLYING DAYS

BY

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"THE STRUGGLE IN THE AIR 1914-1918," AND (WITH GUSTAV
HAMEL) "FLYING: SOME PRACTICAL EXPERIENCES"

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Preface

This is not an attempt to compile a complete history of the early development of flying in Great Britain. That, indeed, would be a task beyond my powers; and I can only express the hope that Mr. J. E. Hodgson, whose *History of Aeronautics in Great Britain* takes us to the latter half of the nineteenth century, may undertake it. In this book I seek only to recall the spirit, the "atmosphere", of the first phase of practical flying in this country, and even this only to the extent of my personal association with it and with the men who made it. This seems the right moment to attempt to place on record a very remarkable and extraordinarily interesting struggle, a struggle against the unmeasured forces of nature; a struggle against inertness, even prejudice, not only of the community generally, but of scientific men; a struggle marked by heroic sacrifice of life, and by a noble giving of means and leisure by many who preferred to pursue in faith a glorious idea than to give their energies to work which promised more immediate and more solid reward.

They conquered, even those who yielded up their lives or were beaten by circumstances, and we know to-day that the air is just as much the element for human enterprise as the sea or the land. One who writes as "Neon" would have us believe that this great struggle has been in vain, or nearly so. But that is a gross misrepresentation. With what purpose and to what end?

I am conscious of a certain presumptuousness in attempting a task which, even with the limitations explained, is really beyond my ability, and at the best I can only hope that my small contribution may help some more gifted writer. Yet I have been privileged with the friendship of many of the pioneers; I have been with them at their work; and I have watched their struggles; to a very small extent I have taken part in their struggles. It is possible, therefore, I dare to hope, that I have been able to place on record part of the great story; and great it is, although not lacking amusing incidents and humorous situations.

Preface

For material I possess abundant records made by myself and others, a very complete library of newspaper cuttings and of the press which has grown up around aeronautics. But the mass of material is too great to explore completely, and probably many events, incidents, names, and achievements are omitted from this imperfect record. A few repetitions have been unavoidable. Again, the first phase, as I regard it, ended with the great War, and although I refer briefly to the War and to aeronautical developments immediately following it, I do so only to mark the transition from the first phase to the present.

The arrangement of my material in chapters and subjects proved extraordinarily difficult, and I am not satisfied with it, and can only beg the reader's charity. I have chosen the photographs rather for their interest than according to any standard of artistic or technical merit. Among them will be found pictures which have been very kindly lent to me by Captain F. S. Barnwell, Mr. L. Howard-Flanders, Captain Geoffrey de Havilland, Mr. F. Handley Page, Mr. W. O. Manning, Lieut.-Colonel Sir F. McClean, Mr. C. Grahame-White, Lieut.-Colonel J. T. C. Moore-Brabazon, Mr. G. Tilghman Richards, Mr. A. V. Roe, Mr. Oswald Short, Major S. V. Sippe, Mr. Howard T. Wright and Mr. T. O. M. Sopwith.

I gratefully acknowledge permission from the respective Editors to quote freely from my own contributions to the *Observer*, the *Daily Telegraph*, the *Times*, the *Field*, the *Daily Graphic* (now incorporated with the *Daily Sketch*), and other periodicals, and from the proprietors (Benn Bros., Ltd.) of *Aeronautics;* and these quotations are acknowledged in the text.

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THE OLD FLYING DAYS

CHAPTER I

THE OLD BRIGADE

Were I attempting to write a full account of the "discovery" of flight and the development of aviation in Great Britain it would be necessary to go back a hundred years, and even further. I have chosen, instead, to write only of the first years of practical flight, and merely to refer to past history by recalling the fact that the first practical expression of the principles on which the flying machine of to-day is based was the model built by two Englishmen, John Stringfellow, a lace manufacturer of Chard, and his friend, W. S. Henson, an engineer. The last-named went to America, but Stringfellow, in 1848, made another model (it was ten feet in span), and made it fly successfully several times.

For the purpose of this book the "Old Brigade" are the men who began their investigations many years before 1907, but were still living, and most of them at work at that time. Some, happily, are living now, and they have the noble satisfaction that their work has been justified; at one time ignored, or even scorned, by the multitude, it is now proved to have been well based on science. Among these pioneers the late José Weiss stood very high, and there is no doubt that posterity will class him with the geniuses of his age.

I used to call on Weiss at his home in South London. We talked and talked, and he gave me a copy of his "Notes on Giant Aeroplanes," which was printed for private circulation, and will, undoubtedly, one day be prized by collectors. Strange to say, the general public heard but little of José Weiss. He was French by birth, but had become British by long residence in this country. When the war of 1870 broke out he was a boy of eleven years, spending a holiday in the Tyrol with his people, and even at that early age he was a keen student of birds, which he loved. He told me he used to speculate on the secret of their wonderful flight with motionless wings.

He spent two years at Lille, studying science and engineering. He was intended for a commercial career; but his desires were in the field of art, and his father's position in life enabled him to follow his bent. It was, indeed, as an artist that he first came before the public. But as a student, with mind open to many things, stretching out to discovery, the wide universe was his playground. There was a factory to which he had access, and in it was a long corridor with a goods railway, the trucks run by power from another room. The even motion of the trucks and the still air of the corridor suggested to him that he might be enabled with their aid to discover something about the exact value of K, the co-efficient of air-resistance, which varies according to the shape of the body. He found many fallacies were in currency, and he came to conclusions which were afterwards fully established. Chief of his discoveries was one which to this day is not fully applied, and that is the value of great size, and the increasing efficiency it promises notwithstanding structure difficulties. Weiss pointed this out long before the rise of the "school" which contends there is a limit to aeroplane size. A simple experiment supports his contention. Thus, a very small aerofoil of a given loading may fall like a stone; but if we make it in a larger size and give it the same proportional loading it glides well. That there is scale-effect is, then, obvious; but the objectors say that when it comes to building big aeroplanes with the engines for their propulsion, the difficulty of providing adequate structure strength to the great span of wing necessary to them cannot be overcome without weight which neutralises all the advantages, and at a certain point, very soon reached, makes further progress in this direction impossible. Weiss held that these difficulties are surmountable, that the problem of the take-off of big machines from sea or land is solvable, and that the economy due to flying immensely big machines must in the long run assert itself.

He carried out experiments which confirmed his belief that the gliding angle of some birds is very small, a gradient of something like one in a hundred. He claimed that the passage of a body through a fluid does not offer appreciable resistance other than skin-friction, provided its shape is such that it coincides exactly with the graph of the normal period of compression and expansion of the fluid. He made a series of model gliders, and then man-lifting gliders, and experimented with them at Amberley, in Sussex, Mr. Gordon England assisting him. The models were perfectly stable, and on one occasion Mr. England found himself 100 feet above the starting point. This was in 1909; and it must have been the gliding height record at the time. No matter how gusty the wind the glider never lost balance. One of these gliders is now preserved in South Kensington museum.

José Weiss belonged to a type of universal genius, of which Leonardo da Vinci was an example. In this type the mind and the eye of the artist are conjoined with the scientific mind. They think with the eye and the soul as well as with the brain. Such men have the joy of great vision, of peering into the mysteries; but often others, inspired by them, accomplish the practical work.

I remember a meeting of the Aeronautical Society in March, 1907, when Weiss gave a lecture on the "Theory of Sailing Flight" (by that he meant the gliding and soaring of birds), and I have before me his article on the basis of experiments which appeared in *Ballooning and Aeronautics* for June of that year.

At the same meeting the late Colonel J. B. Fullerton read a paper on "Wings *v.* Screws." Colonel Fullerton, during a period of years, did useful work in the service of aeronautics, first at Chatham, where the Balloon School and a section of the Balloon Company, under the late Colonel Templer, was stationed. From that time Colonel Fullerton was in intimate association with all the principal experimenters, and he did a great deal of research work himself with the aid of a whirling table. He also made important contributions to the subject of flapping-wing flight, and he was Chairman of the Aeronautical Society's committee on that problem, a committee which published a most valuable report. He was Honorary Secretary of the Society throughout a very busy period of expansion and change.

Going a little further back, the name of the late Edward P. Frost, one of the original members of the Aeronautical Society, stands out. He was for many years on the Council, and afterwards became President, which position he held until 1911. It is necessary to transport oneself back to those early days in order to understand the men who kept the torch of aeronautical knowledge alight. Edward Frost was a real explorer. He designed and built a quadruplane glider, and was at great pains to discover the best materials. Aluminium and suitable steel were not then obtainable. He found that red willow reinforced with cane, and glued and bound like a fishing rod, possessed the properties desired, namely, lightness, strength, and flexibility. He ignored pine wood of any kind, for it seemed unreliable and brittle, although easy to work. Cotton material and silk were used for covering the eighty narrow slats of the four planes. There was £60 worth of silk in that machine. It was a success before the time was ripe, for no suitable motor was then available; but the work put into it has been valuable to other experimenters.

The machine was completed by 1877, and was then fitted with an engine, but not with one of 25 h.p. which the inventor desired: all he could get was a steam engine of 5 h.p. The complete machine weighed 900 lbs., and it had cost £1,000. The fuel used was a mixture of naphtha and another spirit. The whole machine was mounted on four large, strong, wire wheels and the rear wheels were geared and connected by a chain to the engine, the idea being that when the engine started the machine would run forward until a speed of about twenty miles an hour was attained, when the action of the wings would pull it onward and upward and cause it to fly. In 1872, the Prince of Wales (afterwards King Edward VII) whilst shooting in the neighbourhood visited Edward Frost at West Wratting and took much interest in the experiments.

There was a time when any question relating to aeronautics was referred to the late Sir Hiram Maxim, who, in 1894, made a flying machine which only failed for lack of a light engine. Maxim had to be content with a steam engine, and did not at first attempt free flight, but used a contrivance of check rails which would prevent the machine from ascending and at the same time indicate the ascensive force. That the machine had power to lift was fully demonstrated, although damage was done to the machinery. A full account of these experiments will be found in Maxim's book *Natural and Artificial Flight*, which is well worth reading.

In 1909 Maxim built a machine at the Wolseley Works at Crayford. A circular track was prepared for it, and at least thirty workmen were employed in connection with the experiments. One of those associated with those experiments was Mr. C. C. Walker, who is now with the de Havilland Aircraft Company; and Mr. A. P. Thurston worked for Maxim in those days.

The machine was described in the press of the day as a "Pullman of the air," a phrase which is now a well-worn cliché, and may be permitted to convey various impressions according to the reader's conception of aeronautics. The span of the machine was 44 feet. The wings were so arranged that "the lower one had the greater lifting capacity." There were three propellers, a small one fitted to the motor-shaft, and the other two left and right and some twenty-six feet apart.

The engine, the petrol tank, and the driver were considerably below the centre of sustentation. Maxim had made a petrol motor and new carburettor. The motor was one of four cylinders and 80 h.p., and weighed, with circulating pump, oil pump, magneto, and carburettor, only 220 lbs.

I often visited Maxim at his house at Norwood, and despite his deafness, or because of it—for inevitably it tended to give the visitor a listener's rôle—learned much from him. He was a man of strong opinions and faiths, and these were expressed in clear and forceful terms.

He was decidedly "anti-airship," an attitude more excusable in those days than at the present time, for certainly there were frequent airship accidents to point the moral. I must confess my conversations with Maxim gave me a certain amount of scepticism, so that I looked for the flaws in the arguments of enthusiasts who made great claims on insubstantial facts and doubtful data.

In an article in the *Observer* I quoted Maxim as follows: "I cannot see any future for the dirigible, which from its very nature will always be powerless against the wind. The dirigible, like the spherical balloon, can do little more than drift helplessly with the wind. Relatively to the air which it is to navigate, the dirigible is as the jelly fish is to the sea. It is no more resisting than that, and is just as much at the mercy of every current and eddy. Hydrogen gas is the most evasive substance to control. The Zeppelin must leak at the rate of 1,000 cubic feet per hour, and to prevent sagging it is made in many compartments, yet the rigidity of the outside cover depends largely upon the interior pressure." Then, dealing with the non-rigid and semi-rigid type with air ballonnets, he laid stress on the fact that "the air pumped in is as heavy as the air outside."

But it is almost unfair to quote this, for I cannot doubt that had he been able to judge the performance of airships during the war, the patrols over the Channel and the North Sea, carried out with remarkably few breakdowns, and even the Zeppelin raids, considering which a big allowance must be made for the deliberate sacrifice of structural soundness for high performance, he would have come to a different opinion. But more of that in the chapter on airships. Maxim, at any rate, made important contributions to aeronautical science, and his name in this connection is an honoured one.

Coming now to military aeronautics, the first regular Army Balloon School was started in 1878 at Woolwich under Captains C. M. Watson and J. L. B. Templer, and in the next year a company of Royal Engineers received instructions in the field work connected with ballooning. The British Army, so often engaged in small operations in various parts of the Empire and on its fringes, gained more experience in this work than any other army in the world, although, of course, balloons had been used by the French in war in Napoleon's days, and by the American armies in the Civil War.

Captain Templer introduced, or was instrumental in introducing, many important developments in the military ballooning art. He had adventures. On one occasion, in an ascent in a high wind, the balloon was carried against a gas-holder, and Templer's face was struck by an iron stay, and badly gashed. His companion, Captain R. P. Lee, was thrown out, but, fortunately, fell on the top of the gas-holder. Many of the rigging lines were severed, and the basket tilted to one side with Templer's legs, fortunately, entangled so that he was carried up with the balloon which, freed from the weight of Captain Lee, climbed rapidly to a great height, Templer being unconscious. When he recovered consciousness it was to find himself in an extremely dangerous and awkward predicament; but he managed to climb up into the hoop, and eventually get control of the valve line, and although he had no ballast left he was able to make a safe landing. When he was picked up he was half insensible from loss of blood. At the time of Colonel Templer's death I wrote an appreciation of his work in the *Daily Telegraph*, from which I quote as follows:

"I saw Templer make a balloon ascent at the Volunteer Review on the Brighton Downs, at Easter, 1880 (and was fired to enthusiasm). That was very nearly fifty years ago, and at that Review I saw a regiment of cavalry charging in full dress, with brass helmets, tossing plumes, and scarlet. Looking back, one sees it was the passing of the old order and the coming in of a new. Colonel Templer played a notable part in the transition, for under his labours grew the efficient military ballooning and man-lifting kites in which Great Britain was pre-eminent for many years. Moreover, he was responsible for the very first British Army airship, which was completed by Colonel J. E. Capper, was flown over London by S. F. Cody and Colonel Capper in 1907, came down in the Crystal Palace grounds, and was ripped open to prevent it being carried away by the wind. That little airship, 112 feet long, and with only 85,000 cubic feet of gas, embodied the goldbeater's skin envelope, for the construction of which Templer's discovery of a method of sticking together the small skins was essential. Colonel Templer was a very able balloonist.

"In the year after the Brighton Volunteer Review referred to occurred a tragic balloon voyage in which Templer took part. He went up from Bath, accompanied by W. Powell, M.P. for Malmesbury, and Mr. Agg-Gardner. The balloon drifted towards Bridport, on the coast of Dorset, and the aeronauts, seeing the danger of being carried out to sea, attempted to make a landing. Travelling on a wind of about thirty miles per hour, the balloon, which was not provided with ripping panel (a later innovation), touched earth about 150 yards from the cliff edge, Colonel Templer hanging on to the valve-cord, and letting gas out as fast as possible. In the rough-and-tumble landing he was thrown out of the basket with the valve-line still in his hand. The balloon, relieved of his weight, darted up, and Mr. Agg-Gardner jumped out and broke a leg. Powell attempted to get out and descend by sliding down the trail-rope, but before he could do so he was carried out over the Channel, and was lost.

"Templer improved for ballooning purposes the compression and storage of hydrogen gas in cylinders, which greatly reduced the time occupied in balloon inflation, and he did a great deal of organising field balloon work, the result of which was that three balloons were sent out in 1884 with Sir Charles Warren's Bechuanaland expedition. In 1885 Templer took three balloons to the Sudan, and was present at the engagement at Hasheen, being mentioned in despatches. For the South African War he sent out four balloon sections; but he served as Director of Steam Road Transport. At Fourteen Streams one balloon was worked for thirteen consecutive days, and the observations were very valuable. The secrets connected with the manufacture of gold-beater's skin balloons and of man-lifting kites were at this period much sought after by foreign powers."

Colonel (now Major-General Sir) J. E. Capper, R.E., was appointed to the superintendence of the Balloon Factory at Farnborough in 1906, and when he retired in 1910 Mr. (now Lieut.-Col.) Mervyn O'Gorman succeeded him, and it became known as the Royal Aircraft Factory (now the Royal Aircraft Establishment). Colonel Capper will be chiefly remembered in connection with the early airship experiments at Farnborough, in which he was assisted by Cody. The first and second ships were nicknamed "Nulli Secundus." The first was not successful, and the employment of gold-beater's skin in its envelope made it very expensive. It was the second ship which, as already related, landed in the grounds of the Crystal Palace. Considering the restrictions as to expenditure under which he laboured, Colonel Capper did wonderfully well, and for many years he was one of the most conspicuous personalities in the aeronautical movement.

To the same generation belongs Major B. Baden-Powell, to whose work I refer in several places. He was one of the early balloonists, and took part in many competitions, but he made some valuable and suggestive contributions to the science of the flying machine, whilst not the least of his achievements was the inauguration of *Aeronautics*, first as a supplement to *Knowledge*, of which he was the editor, then as a separate publication. Major Baden-Powell has invented many things of scientific value. He now lives in the country, and spends a good deal of his time in his small, scientific "workshop."

Among the balloonists the name of the late C. F. Pollock stands out throughout these early years. He at one time held the record for balloon voyages across the Channel, although I must here refer to Colonel Frank Burnaby, the hero of the ride to Khiva, whose adventurous trips across the Channel are recorded in that fascinating little paper-covered book, *A Ride Across the Channel*, which will certainly be an object of the collector's quest. Pollock was a very keen balloonist, and so far as science comes into the gentle art of ballooning he was a scientific balloonist. When the War broke out he was placed in charge of balloon training, which was an essential part of the apprenticeship of kite balloon and airship pilots. For a time I served under him, and any who read these pages who were in the same good fortune will agree there never was a more liked and revered officer in that part of the Service.

I sadly disappointed him on one occasion. The opportunity of weather had to be seized, and after a few days of enforced idleness a Sunday morning came with fine weather and a good wind from that unusual quarter, nearly due south. For a month I was temporarily acting as balloon pilot in charge of parties of Probationary Flight Officers R.N.A.S., and on that day I had charge of one of the 80,000 cubic feet balloons and half-a-dozen youngsters, including two Japanese officers.

"Now, Turner," said the C.O. before we started, "you can make a good run of it on this wind."

I imagined he meant we could get a fair distance, not having to trouble about approach to the sea, and then in the usual way land as near as possible to a railway, and pack up and return by the evening in order to be ready for work next day. But I had not reckoned on Pollock's enthusiasm, and I was concerned not merely for that day's trip, but for getting the balloon and the lads back in time for the following morning.

Directly we got up we found that the statoscope was out of order and that we should have to adopt less certain methods of finding out whether the balloon were just climbing or just descending at any moment. Well, that did not matter much; a few scraps of tissue paper thrown out of the basket indicate roughly what the balloon is doing. They are so light that if they are seen to drop rapidly away it may be assumed the balloon is rising, whilst if they keep in the neighbourhood of the basket, or ascend, it is clear the balloon must be falling.

However, we travelled gaily on, slightly to the east of north, and got well up into Lincolnshire; and then I had to consider what was to be done. It was clear from the map that if we went any farther we should be far from railways with Sunday services, and would have to put up for the night. It would have been possible to get well up into Yorkshire, but that would have meant not getting back into London until the following afternoon.

I brought the balloon down in a big, stubble field near Newmarket, finishing up, in spite of ripping, with a glorious drag of a couple of hundred yards. We caught a train from Newmarket, helped by a lorry and some air mechanics from an aerodrome in the vicinity, and I felt that I had done rather well. But what was my amazement on reporting to Colonel Pollock in the morning to be greeted with:

"Well, Turner, I thought you were going to make a long run of it! Such a wind as that was not to be missed." And the worst of it was he meant it, although, of course, agreeing I had done the correct thing. It is, however, a very pleasant memory I have of Pollock: he was in so many respects so boyish; a huge fellow, the soul of kindness, and wonderfully efficient. Alas, he did not long survive the War. He was suffering from a fatal malady, and lived a very lonely life, no doubt in great depression after the activity of Service.

Whilst on the subject of balloonists I must refer to the late Rev. J. M. Bacon and his daughter, Miss Gertrude M. Bacon. I occasionally met them both, and it occurs to me there may be ways as good as preaching of pointing men to the heavenward path; and I write that in all seriousness, for surely by the work and works of such men as J. M. Bacon men may become discontented with the muckrake habit.

The story of his balloon voyages are told in his numerous books. Often he went up for some scientific purpose, and he made many night ascents, sometimes accompanied by his daughter. He did not attempt record-breaking, nor racing, but loved ballooning for its own sake. He died in 1904, and his daughter carried on his work by writing and lecturing on ballooning and flying.

Another well-known balloonist is Lieut.-Col. John Dunville, one of the first members of the Royal Aero Club, and always a tower of its strength. He holds the duration record so far as this country is concerned, just beating the time taken in the balloon voyage to Russia in which I took part. But he was not tied to ballooning; he took an active part in organising aviation meetings in the early days. He usually enters a British balloon for the Gordon Bennett race.

He also was engaged in balloon training during the War, and was C.O. at Roehampton for a time; and it is sufficient to say that he was a shining example of that class of civilian which was able to bring to the Service a knowledge of affairs and of the world too often denied to the ordinary Naval or Army officer, but of inestimable benefit to the British cause. Colonel Dunville had great executive ability, and often carried things through despite the inertness of the Admiralty. He was an ideal blend of kindness and, when necessary, strictness; and he had the respect and affection of high and low.

Another of the Old Brigade was Colonel F. C. Trollope, of the Grenadier Guards. Attached to the R.E., he went out with the balloon detachments to Bechuanaland in 1884. Trollope did a lot of useful work, often behind the scenes, and helped S. F. Cody in his struggles. I occasionally had lunch with him, and I find many memoranda relating to his activities in connection with the Territorial Associations.

In the first ten years of this century the feeble life of the new child of man's mechanical genius had to be very carefully nursed. Those whose interest in aeronautics dates from the War or the post-War period have little idea of those times. Many of them seem to imagine that quite suddenly, with the first flights by the Wright Brothers and Santos Dumont, the world was more or less converted to the idea of air travel. Those first flights were, after all, steps in a long and arduous path of investigation and experiment. They were helped, indeed made possible, by the petrol motor, although for that matter it has been suggested that if the arrival of the light internal combustion engine had been delayed for a score of years we should have learned more about the motorless flying machine, so that when the engine arrived we should have made fewer mistakes. I do not subscribe to that belief; it seems to me to have no more foundation than that other idea, to wit, the supposed detrimental influence of the Gnome motor on flying. There is, however, a possible reason for believing that the War, by giving aircraft design certain definite tendencies to wrong purposes, may have hindered the development of the true commercial machine, notwithstanding the money that was poured out during that period on research and experiment.

A prophet of aviation before the present century dawned was Mr. Patrick Alexander. As a boy, in 1878, he built an elastic-driven model of the Penaud type. His father was the manager of Cammells of Sheffield, and in the seventies Patrick was helping to roll steel plates, and was getting an insight into industrial chemistry. In 1879 he saw Giffard's airship make ascents at Paris, and four years afterwards he was sent to sea as an apprentice. It may be recalled that in the eighties steel-faced armour plates were first made, and in the nineties whole-steel plates. Mr. Patrick Alexander was brought up in an atmosphere of armaments, Naval programmes, and scientific developments generally. And, by the way, twenty years ago he was assuring me that the future of the great rigid airship in war and in transport would be tremendous; not that he scorned the heavier-than-air side. It needed faith and nerve in those days to come out with such a declaration.

Mr. Alexander is a big man, physically and mentally. His conversation is very often ahead of the times, and suggests a meeting of the British Association, shall we say, from ten to twenty years hence. He has attained a "plane" higher than that of aviation and assures me that levitation is soon to be "let loose" on an all unprepared world. His conversation covers every field of scientific endeavour, and is amazingly well-informed. He is a member of most of the scientific Societies, and a diligent lecture-goer. Industrial movements and social conditions enormously interest him.

He has known everybody in the aeronautical movement in all countries for the past forty years, and he recalls that Bristol University as long ago as 1886 had a wind-tunnel with electric fans for aerodynamic experiments. He has travelled all over the world, and indeed, until the War, he was an inveterate traveller.

He was making balloon ascents with the late A. E. Gaudron early in the nineties, and in 1894 he made a parachute descent from a hot air balloon; and at that time he had already "run through" eight balloons.

He went to Berlin in 1891 with a balloon made by the Spencers, and in Germany he made a trip in the famous "Preussen" balloon.

He assisted the Russian Government in connection with railway construction, and wherever he went he found scientists eager to discuss the problems of flight, in Russia particularly. In fact, he was recognised in all countries as an authority on the subject, and he knew Zeppelin in the days of his first experiments. He helped Langley, the famous American experimenter who very nearly preceded the Wright Brothers with the first man-lifting, motor-driven flying machine. He helped the Wright Brothers in many ways in 1902. In 1903 the Wright Brothers got off the ground, and in the following year Mr. Alexander described their work to the Aeronautical Society, as he had sometime before described that of Zeppelin. He went with the Wright Brothers to New York, in 1906, and he introduced them to the late Hon. C. S. Rolls. Some of the American newspapers described him as a Russian!

In 1911 he offered £1,000 in an aero-motor competition, and the prize was won by the Green motor, but the Government made some demur about the conditions, and the competition was held again; and again the Green motor won.

Then Mr. Alexander went out to the Amazon to "hunt the cyclone," and to discover its origin. He has always been a keen student of meteorology, and towards the end of the War he was in charge of the Falmouth Meteorological Observatory under the Air Ministry meteorological department.

The Imperial Service College at Windsor has been one of his outstanding interests, and he has treated it with great and long-continued generosity, and is still associated with its work. The object of this excellent institution is to give the sons of officers of limited means a sound education fitting them for Woolwich or Sandhurst, and enabling them to rely upon their own resources when they enter one of the Services or adopt some other profession. It is an essentially modern, practical, scientific school.

It would be impossible to give a list of Mr. Alexander's benefactions, private and public. Many of them can never be known, for he has never talked about them. But he helped many a needy inventor, and lifted many a lame dog over a stile. In fact, he was far too generous for his own interests; but, happily, he is one of those rare souls who lay little store by personal aggrandisement. If he had had the strictly commercial mind he might have been a millionaire through the exploiting and development of his own ideas in mechanics and science. The world, alas, has few rewards for those who do not pay strict attention to the business of grasping rewards, and even the Honours at the disposal of a Government tend to foster the "get on" spirit. But there are choicer rewards enjoyed by the mind rather than the pocket, and I am not going to commiserate Mr. Patrick Alexander. Happily he is still with us, often in the Aero Club, alert as ever to developments, frequently attending Aeronautical Society discussions, and occasionally to be seen at flying meetings and R.A.F. Displays.

CHAPTER II

EARLY DAYS AT EASTCHURCH

THE Royal Aero Club's first aerodrome at Sheppey was opened in February, 1909. It was situated near Leysdown, and a house called Mussel Manor was turned into a Club House. The late Horace Short and his brother, Mr. Eustace Short, put up workshops and bungalows, and a few members built sheds for themselves, among the first being Mr. (now Lieut.-Col. Sir) Francis McClean, Mr. (now Lieut.-Col.) J. T. C. Moore-Brabazon, the Hon. Maurice Egerton, the late Cecil Grace, Mr. Percy Grace, and the late Hon. Charles S. Rolls. Subsequently a move was made to Eastchurch.

A small book on the Eastchurch Air Station was recently published by an officer of the R.A.F., the proceeds of the sale to go to charity, and I am indebted to this book for one or two details which I might otherwise have forgotten.

In one respect Eastchurch became a more important centre of aviation than Brooklands or Hendon. From the first it enjoyed the favour of wealthy experimenters, and it soon became a home of an aeroplane industry. Brooklands was rather the resort of the amateur designer, or at any rate the designer who laboured under the disadvantage of poverty. Hendon was chiefly the home of flying sport. Eastchurch, however, not only possessed the advantages mentioned, it was particularly fortunate in the fact that the late Horace Short worked there. It was largely at Eastchurch that aeronautical technology was built up, and from Eastchurch the Accidents Investigation Committee of the Royal Aero Club was chiefly constituted. Even subsequent to the establishment of the Royal Aircraft Factory at Farnborough that Committee proved more than once to be the soundest technical authority in this country, and one has only to refer to its reports on certain accidents to discover that it was at times able to instruct Farnborough. All this was largely due to Horace Short, who undoubtedly was a genius.

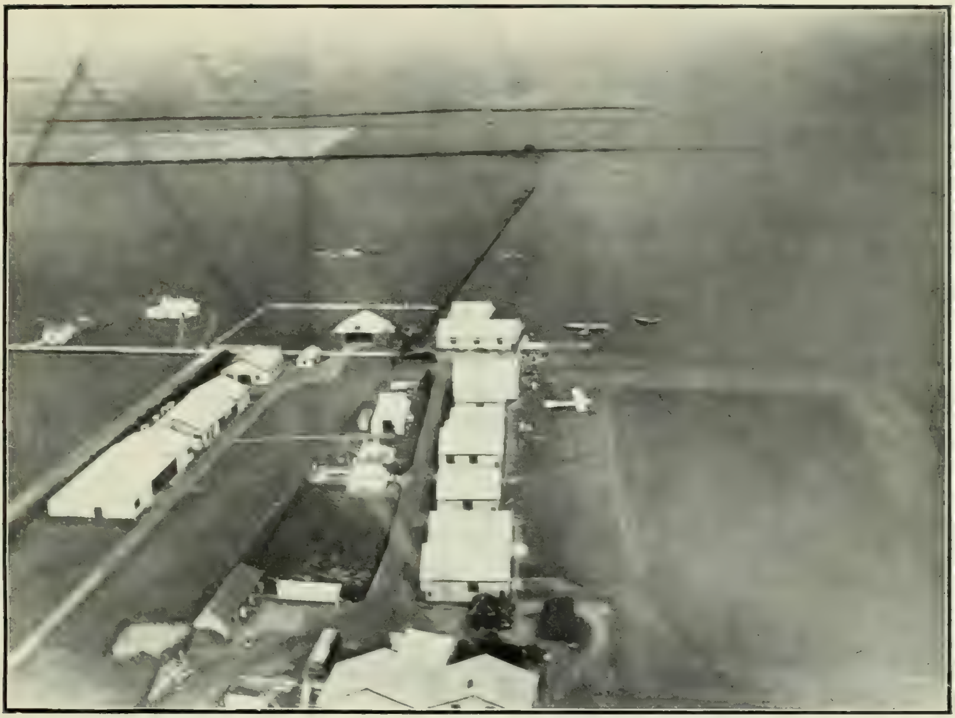
Mr. J. T. C. Moore-Brabazon was the first to fly at Leysdown. He used a Voisin "Pusher", called the "Bird of Passage", and made his first flight there on February 27, 1909. On the following day he damaged the machine in landing. I find I have a note on this machine stating that it was "very heavy," weighing nearly three-quarters of a ton. There are fifteen-ton machines to-day!

This, however, was not Mr. Moore-Brabazon's first appearance in the field of aeronautics. He had built an aeroplane long before Leysdown and Brooklands were opened. He calls that first essay "a rather comic construction." It had a Buchet engine, four-bladed propellers, rudders at the side, and a trailing, stabilising plane in addition to an elevator. This machine was being built at the same place and time as Mr. A. V. Roe's first machine, in 1907. It never flew.

At Leysdown, on October 30, 1909, Mr. Moore-Brabazon, on the second machine built by Short Brothers, fitted with a 60 h.p. Green engine, won the *Daily Mail* £1,000 prize for a circular flight of a mile on a British machine. He, by the way, was granted the first aviation certificate issued by the Royal Aero Club, and is sometimes familiarly known as "No. 1." As a boy he had been keen on motoring, and he served an apprenticeship at the Darracq works in France after leaving Harrow. On returning to England he joined the firm of Warwick Wright, which afterwards became associated with the development of flying chiefly through Mr. Howard Wright's activities.

Mr. Moore-Brabazon's first acquaintance with the air as a medium of travel was through the balloon. He made ascents with the late Hon. C. S. Rolls. But like many others, he quickly realised that the future lay with air vehicles that one could control, not mere drifters. In the workshops of Warwick Wright, and in association with Mr. Howard Wright, he became an enthusiast, but soon realised it was necessary to go to France, where many successful experiments were in progress. Hence the Voisin machine on which, as he says, it took about a mile to do a turn. There was no such thing as "banking"; the vertical panels between the planes were not consistent with the theory and practice of "banking" on turns.

Mr. Moore-Brabazon sold the "Bird of Passage" to Mr. A. E. George, another of the Eastchurch community; and the late Cecil Grace acquired it afterwards. Each one of its successive owners had accidents on it. Meanwhile Mr. Moore-Brabazon was keen on getting a British machine, and he spent his time on this effort, instead of attempting the performance of feats, such as the first Channel Flight, which might easily have fallen to him. But some idea of the hard circumstances in which flying was carried on in those days may be gathered from the



from Sir F. McClean's Aeroplane
Eastchurch Aerodrome, by Dr. W. J. S. Lockyer

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fact that at this period Mr. Moore-Brabazon's repairs bill averaged £300 per month. Of course this could not go on, and at the time of his marriage to Miss Krabbe, an enthusiastic balloonist who awarded a Cup for the longest balloon voyage in England, he had given up his more practical association with flying, although he is still one of its most valuable supporters.

But this is a chapter on Eastchurch, where Short Brothers were building six Wright biplanes, all of which had been ordered by members of the Club, one of them Mr. Moore-Brabazon, and another Mr. Frank Pitman. Here is a story of Horace Short and his brother, Oswald.

One morning when Mr. McClean was preparing to make a flight an unknown lady approached and begged to be taken up as a passenger. The pilot was not too eager to do this, but as another passenger had just been landed he had no ready excuse for refusal. He was on the point of assenting when Mr. Oswald Short took him aside and remarked in a low voice:

"That woman is carrying a long knife in her stocking."

The idea of taking her into the air became even more distasteful and the pilot was preparing to refuse when Horace Short came up, and while the lady was gazing at the aeroplane, and giving a glance from time to time to the three men, he learned about this extraordinary affair, refraining from laughing only with difficulty.

"Well, Short," said Mr. McClean addressing Horace, "if you will get the knife away from her I'll take her up."

"All right," said Horace; and to their amazement he approached the lady and began to converse with her, strolling away from the machine towards the Club House.

In two minutes they returned, and he carelessly rejoined his brother and Mr. McClean, and without being observed by the lady showed them a long and formidable knife.

With no great enthusiasm the pilot now fulfilled his part of the bargain; the lady was given a flight. Shortly afterwards they learned that she had been readmitted to a nursing home for mental cases!

Horace Short never revealed the cajolery by which he had disarmed this dangerous aeroplane passenger.

The story reminds me of an incident in Mr. A. V. Roe's career. When he was flying on Lea Marshes he received a letter from a lady who told him she had heard of his experiments with enormous interest, and that she was full of admiration, and would he permit her to fly the aeroplane? There was more to the same effect. She, too, it turned out, was an inmate of a private asylum.

And that incident recalls another. Captain Hugh Watkins had an alarming experience at Brooklands on one occasion. He had only made a few flights when one of his first passengers, a distinctly stalwart lady, suddenly, in fright, threw her arms round his neck, preventing him from controlling the machine. Without a moment's hesitation he struck her a violent blow under the chin, partially stunning her; and then without more ado he landed. This prompt action probably averted extremely unpleasant results.

The late Professor A. K. Huntington used to fly at Eastchurch, and he amazed everybody for a long time by getting a most difficult machine, the Dunne, off the ground when other pilots completely failed. Huntington seemed to have no difficulty; and this went on for a long time until theories that the Professor possessed some wonderful secret of flight began to be discussed. He was challenged to reveal it.

"Certainly," he said, "come along here," and he led the party out over the aerodrome.

"Now," he continued, "I always make for this," and he pointed to a slight hump in the ground, imperceptible from a short distance. "I run the machine here, and simply yank her off."

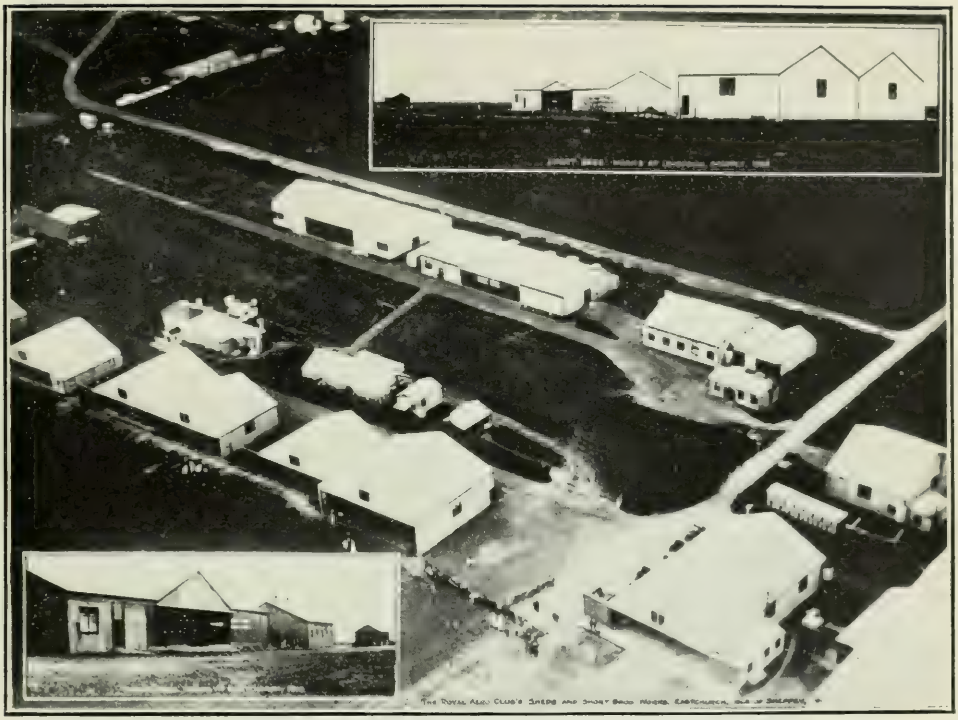
This, of course, meant that he got away with the barest margin of lift.

Professor Huntington won numerous balloon prizes, and he learned to fly when he was nearly sixty years of age. He held the Chair of Metallurgy at King's College and was an authority on explosives. He was employed during the War by the Admiralty in this department; but his researches covered a wide scientific field. His death in 1920 was a serious loss to aeronautics.

The Dunne aeroplane referred to was the invention of Captain J. W. Dunne, who came to Eastchurch in the autumn of 1909, and carried out experiments with the tailless, inherently-stable machine described elsewhere. The aerodrome was a rather rough one, and landing accidents were common. One of the work-people hit on the idea of burning the grass in the hollows, thus revealing the locality of dangerous inequalities.

It was about this time that I met Mr. Leo Jezzi. This reminds me that many of our best pilots have suffered from an impediment in speech, Mr. Jezzi among them. The late Squadron-Leader J. L. Travers (also at Eastchurch), Wing-Commander T. O.'B. Hubbard, and the late Captain Gordon Bell were in like case.

Mr. Leo Jezzi's work calls for more than a passing reference.


The Royal Aero Club's Sheds and Short Bros Works, Eastchurch, Isle of Sheppey.

Eastchurch 1911 (inset Leysdown 1909)

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There was a good deal of truth in the remark once made of him to the effect that he arrived at Eastchurch with "a bundle of calico under one arm and an old packing-case under the other, and an old motor-bicycle engine on his back, and in a few months he had built a machine that was flying around the aerodrome, and got his ticket!"

Mr. Jezzi's daily work lay in the City, and he did his aeronautical experiments in his spare time. He had a strong bent for mechanics, however, and nearly all his recreation had taken that direction. In 1908, when he was thirty-two years of age, a belief he had long held that mechanical flight was practicable received impetus from the news of the work of French aeronauts, and he determined to start making a machine. An old school friend promised to help as much as possible—a promise that was fully carried out through many troubles and difficulties. Most of Mr. Jezzi's friends told him he was quite mad and would break his neck.

Mr. Jezzi and his friend found many difficulties in designing and building the machine, and had to learn to use their tools as they got on with its construction. They wasted many hours by faulty workmanship, but by brute force completed the task. They made mistakes in construction and design, but the machine flew. Opportunities for learning to fly were limited to calm weather when it occurred at week-ends, and it was not till August 10, 1910, that Mr. Jezzi got a really good flight. His chief trouble at first was trying to discover whether erratic movements in flight were due to the machine or to his erratic piloting. Landing was easy, and in hundreds of landings (probably 900 or 1,000) only one wheel and skid were broken.

The first work on the Jezzi aeroplane was in a shed at Shawfield Park, Bromley, early in 1909. It was completed by the end of December, 1909. In January, 1910, it was moved to Eastchurch. A first trial in March demonstrated that it would be necessary to fix springs to the landing carriage. When this was done and the machine tried again flight was attained at a first attempt, but owing to want of confidence on Mr. Jezzi's part flight was limited to about 250 yards at about six feet.

The engine was a 35 h.p. 8-cylinder, air-cooled J.A.P. with overhead valves. Two propellers, 5 feet 9 inches diameter by 4 feet 6 inches pitch, working between the trailing edges of the planes, were driven by chains, one crossed. The machine was controlled by a biplane front elevator. For lateral control the outer six feet ends of the trailing edges of both planes were flexible. There were two rudders between the planes of the elevators, and two rudders on the tail.

Towards the end of 1911 Mr. Jezzi started building a small tractor biplane at Bromley, and early in 1912 he assembled it at Eastchurch. This was driven by the same J.A.P. engine. With this he reached a speed of 65 miles per hour.

When he started operations at Eastchurch in January, 1910, the only others there were the late Cecil Grace, the late J. L. Travers, Captain Dunne, the late Hon. C. S. Rolls, and Professor Huntington. Later on Mr. Moore-Brabazon and the Hon. Maurice Egerton had their machines and sheds moved from Leysdown to Eastchurch, and they were joined by Mr. McClean and Mr. Alec Ogilvie, Mr. A. E. George, Major H. C. Brocklehurst, and some Naval Officers who were being taught flying. Mr. (now Major) G. C. Colmore flew a Short biplane.

A great many friends came to Eastchurch at week-ends, and sometimes there were five sleeping in one of the sheds. Mr. Jezzi gave hundreds of passenger flights on the tractor biplane, and a number of men who afterwards became pilots had their first flight on this machine.

Mr. J. Dare, a member of the well-known theatrical family, had a shed at Eastchurch, and a Howard-Wright E.N.V. biplane. He did a little flying. His shed was furnished and fitted up in an exceedingly comfortable manner, and he was often visited there by his sisters.

The Hon. Maurice Egerton, one of the purchasers of the six Wright machines built by Short Brothers, won Aero Club prizes at Eastchurch for a flight of twenty-five yards and a circular-mile flight. During one of his flights he caught his right hand in the reduction gearing and had to have a finger amputated.

Mr. (now Sir) A. Mortimer Singer, another of the company, flew at the aviation meeting at Heliopolis, near Cairo, in February, 1910. He had an accident, and was still on crutches in the late summer of that year. He bought his first machine in 1909, and gained experience on the Blériot, Voisin, and Farman types. He is a yachting man, and was a balloonist. He is, by the way, a member of the sewing machine family, and his brothers, Mr. Washington and Mr. Paris Singer, are both prominent in sport.

By September, 1910, there were eighteen sheds at Eastchurch, Mr. Howard Wright, Mr. G. C. Colmore, and Mr. T. O. M. Sopwith being among the tenants. Mr. Sopwith was keen on winning the Baron de Forest prize of £4,000 for the longest flight from England to the Continent, and he had a Howard Wright biplane, fitted with an E.N.V. engine. The story of his success is one of the remarkable ones of the time.

Short Biplane on which Moore Brabazon
won prize for first mile circuit

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The engine had never run satisfactorily for more than ten or twelve minutes, and here was the pilot waiting to set out on a journey of some hours, including crossing the sea! The victory he won was due in large measure to Mr. F. Sigrist, who locked himself up with that engine for several hours and somehow managed to remedy the trouble. . . . At any rate, it had been utterly hopeless before Mr. Sigrist's argument with it, and it flew for three-and-a-half hours to Thirlemont, in Belgium, a distance of 177½ miles, on December 18, 1910, so we may take it that Mr. Sigrist had by that time well developed those persuasive and difficulty surmounting qualities which in the intervening years have made him the universally-liked and very valuable personality he is in the aviation industry as Mr. T. O. M. Sopwith's partner in the Hawker Engineering Company.

The late Cecil Grace, who was lost in a flight over the Channel in 1910, was a man who would have done much for flying had he lived. He may have been over-daring, but he would have spared neither his time, nor his means, nor himself. On Easter Monday, 1910, he had a race with the late C. S. Rolls at Eastchurch, and several times he flew so close as to get into the backwash of Roll's machine, and was tossed about violently. He and his brother had a large shed with an office where they kept typewriter and account books. A small Clément motor supplied power and light. From the roof was suspended the "Bird of Passage," a discarded machine already mentioned. They had a numerous staff, and horses were available for towing broken machines back to the shed; also a bridge-building equipment for getting aeroplanes across the numerous dykes.

During 1910 Mr. McClean offered the loan of aeroplanes for the purpose of training Naval officers, and the Admiralty accepted. The first four officers trained under this scheme at Eastchurch were Lieutenants C. R. Samson, R. Gregory, and A. M. Longmore, and Captain E. L. Gerrard, R.M.L.I. (all are of higher rank now). Lieut. Samson, soon after learning, put up a British duration record with a flight of 4 hours 58 minutes, whilst Captain Gerrard made a flight of 4 hours 15 minutes with passenger. Mr. G. B. Cockburn gave his time as instructor, without any cost to the Admiralty. Cecil Grace was to have been instructor, and Mr. Cockburn stepped into the breach when Grace was lost. Horace Short gave the pupils technical instruction.

The agreement between Mr. McClean and the Admiralty was that two machines should be lent for instruction. It was on one of these that Cecil Grace was lost; and another was built to take its place, and yet another was added. The machines were a Short-Farman Pusher 50 h.p. Gnome; a similar machine first fitted with a 60 h.p. Green and afterwards with a 50 h.p. Gnome; and another Short-Farman with a 50 h.p. Gnome. But, in addition, Naval pilots flew the following machines, which also belonged to Mr. McClean, a Blériot 50 h.p. Gnome which crashed; a Short fitted with a 70 h.p. Gnome (afterwards returned to the donor); and two very interesting twin-engined aeroplanes. These were designed by Short's, and were each fitted with two 50 h.p. Gnome engines. The first of these machines was the first two-engine aeroplane that ever flew. One engine, in front, drove two tractor screws by chains, whilst the other engine with its one air-screw was in the ordinary "pusher" position. There were, therefore, three screws to this remarkable aeroplane. The other was simply a single-engine pusher converted by adding another engine in front, and placing passenger and pilot side-by-side. She was unstable, and came to grief. This one was called the "Vacuum Cleaner", as the draught was said to pull hairs out of a fur coat, and her more successful companion was known as the "Triple Twin."

Among the early Naval machines of 1911 were a monoplane on Blériot lines with two engines, called the "Field Kitchen", and a two-engine monoplane called the "Double-Dirty".

Eastchurch has been the scene of many interesting developments, and the firm of Short Brothers played a big part in them. Thus the first amphibious flying machine was produced there. It was not completely amphibious, however, for it could not ascend from the water; rather was it an ordinary land plane with flotation bags, such as were afterwards developed by the same firm during the War.

Eastchurch was also the training ground for the members of the London Balloon Company R.E. (T.F.), for whose use two Short machines, the gift of Mr. McClean, were available. But the War Office stopped all this in February, 1912, deciding that the personnel of the London Balloon Company should not be trained in flying. Nevertheless, four members had made enough progress to obtain their certificates. At a subsequent date others qualified, and the list of names includes that of Wing-Commander T. O.'B. Hubbard, Mr. S. P. Cockerell, and Captain V. A. Barrington-Kennett.

Among the aviators trained at Eastchurch were Captain Godfrey Paine, who was afterwards appointed Commandant of the Central Flying School and head of the Naval Air Service, Engineer-Lieut. E. Featherstone Briggs, and Lieut. J. W. Seddon. At Eastchurch several pilots who had learned elsewhere took up their abode, these including Lieut. (now

Lieut.-Col.) D. A. Spenser Grey, the late Lieut. W. Parke, and Captain R. Gordon.

Lieut. Spenser Grey learned to fly in the summer of 1911. He learned at his own expense and in his own time; in fact, he had only seven days' leave when he went to the Hewlett and Blondeau School at Brooklands; and he made the stipulation that he should be allowed to have a try for his "ticket" at the end of the week, whatever state his training had reached by that time, a sporting proposition that was accepted. He succeeded in passing the tests in the time at his disposal. Proud of the achievement, he presented himself at the Admiralty in the hope of being taken as a flying officer, only to meet with a rebuff. Undiscouraged by this, he proceeded to purchase an aeroplane of his own, a Blackburn monoplane, and fly over the fleet at Weymouth. To be a monoplane flyer in those days was something of an achievement; indeed, I doubt if there was any other Service aviator qualified to fly one at that time, and no doubt the Naval authorities were impressed.

At any rate, we find him eventually taken on as a flying officer at Eastchurch, where he made with Lieut. Samson a memorable flight round the coast from Sheerness to Portsmouth. On March 1, 1913, he flew, with Lieut. C. J. L'Estrange Malone as passenger, from Brooklands to Hendon on a new Admiralty 80 h.p. Sopwith.

In August, 1913, he was stationed at Calshot, and used to journey to and fro to his home at Southsea by seaplane, leaving it moored for the night near South Parade Pierhead. On September 2, 1913, he took Mr. Winston Churchill for a flight, and then Mrs. Winston Churchill, at Hamble, on a Navy 90 h.p. Austro-Daimler-Sopwith tractor, and he afterwards gave Mr. Churchill lessons in flying.

On March 25, 1914, he had a bad accident at Eastchurch on a Sopwith C 149, injuring his shoulder and preventing him from flying for sometime.

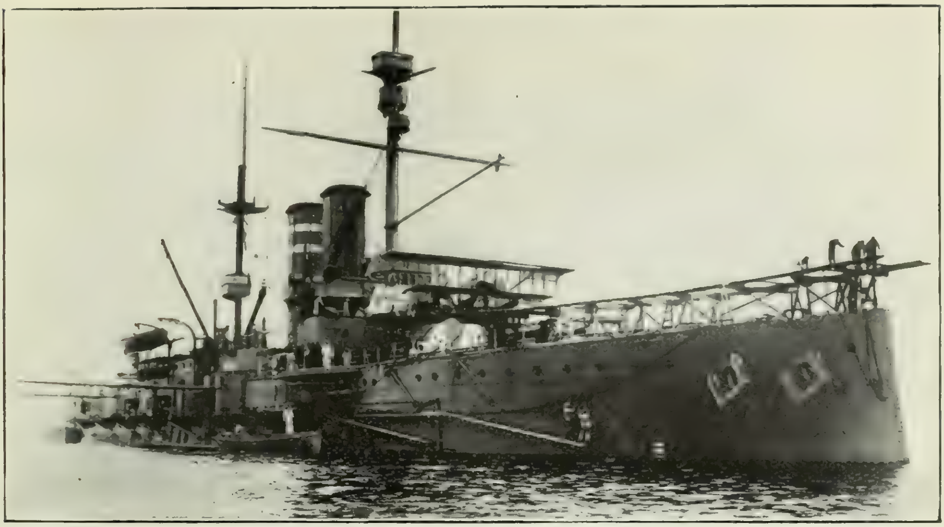
When War broke out he went over to Belgium and took part in some of the early bombing raids which the Royal Naval Air Service made on Dusseldorf and Cologne, for which he received the D.S.O.; and he was afterwards in charge of the R.N.A.S. Squadron at Dunkirk.

Eastchurch aerodrome was raised to international fame in the summer of 1911, for it was chosen for the Gordon Bennett air race, which had to be held in this country, the cup having been won for Great Britain by Mr. C. Grahame-White at the race at New York, the previous year. From the popular point of view a less convenient locality for so important an event could scarcely have been chosen. However, all the aeronautical world assembled. Out of the original entries only the following were ready on the day:—Great Britain, A. Ogilvie on a "Baby" Wright; D. Graham Gilmour on a Bristol; Gustav Hamel on a Blériot; France, A. Leblanc on a Blériot, and Chevalier and C. Nieuport on Nieuports; America, C. T. Weymann on a Nieuport.

Before the race trials had been flown, and as a result of them M. Louis Blériot realised that if he could not get a trifle more speed out of Hamel's mount he would be beaten by one of the Nieuports. Accordingly the port and starboard wing extremities of Hamel's Blériot were clipped, the result being less air resistance and a heavier wing-loading, these advantages, however, at the cost of some slight sacrifice in controllability. That at least was what it looked like when we saw Hamel lose control and crash in a practice flight. Happily, he was not seriously hurt; but Great Britain was deprived of all possibility of a victory. In the end Weymann won, with an average speed of 78.77 m.p.h., with Leblanc a close second. Mr. Alec Ogilvie, who was the only other pilot to finish, went round the course at an average speed of 52 m.p.h.

I think it must have been in the following year that I saw the late Captain C. E. Risk set out from Eastchurch to fly to Gosport in more than half a gale of wind. Risk was always "full out." He was a familiar figure at the Royal Aero Club. He was the first officer I had to interview at the Admiralty when I applied for a job at the beginning of the War. At that time he was "armoured cars," to which I am glad to say I was not condemned. After the War he and I shared an adventurous flight round Britain in one of the races for the King's Cup. I was up in the Blackburn "Kangaroo," flown by Mr. R. W. Kenworthy, and Risk was one of Colonel Spenser Grey's passengers in another "Kangaroo." The two ambled round the course together at the tail of a straggling field. But the flight was memorable on the second day of it when Spenser Grey, who was so ill he could hardly walk, nevertheless, despite our efforts to dissuade him, insisted on continuing. Risk was air-sick and returned from Newcastle by train. Spenser Grey kept with us all the way and made a perfect landing at Croydon as night came on. The two "Kangaroos" kept together, and we missed the Bristol control in order to get home that night.

Risk went to live in France and died there from pneumonia in 1926. He was an officer of the Royal Marines, and in 1913 was appointed O.C. Harwich Naval Air Station. On April 11 that year he crashed on an H. Farman, and he and his mechanic



Short Seaplanes. First Warship Experiments

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were injured. Again on October 22, on a Borel seaplane, 80 h.p. Gnome, while flying out to the "Enchantress" to meet the First Lord of the Admiralty, with Lieut. C. E. H. Rathbone as passenger, he "crashed" on the water and had a narrow escape, being trapped under his machine; and he only extricated himself with difficulty.

Lieut. Samson, who became C.O. at Eastchurch in 1911, made the first aeroplane flight from the deck of a British warship. In January, 1912, he flew over to Sheerness Harbour from Eastchurch, and his Short biplane was hauled on board the battleship *Africa*. An improvised wooden staging was placed on the deck, extending from the fore turrets to the bows. From this platform he made a successful ascent exactly half-an-hour after the aeroplane had been brought alongside. When the engine was started up the biplane was held back by blue-jackets, but having found that everything was in order, Lieut. Samson gave the signal to "let go," and the machine ran down the staging, and after passing the bows rose steadily to a height of about 100 feet, amid cheers from the *Africa* and the warships in the vicinity. The pilot encircled the battleship at an altitude several feet below her topmast, and then rose to a height of 300 feet and flew back to Eastchurch.

This was subsequent to Ely's flight from an American warship.

During the Naval Manœuvres of 1912 Lieut. Samson and Lieut. Malone flew the same machine, a Short fitted with wheels as well as floats, from H.M.S. *Hibernia* at Weymouth while the vessel was steaming; and these were the first flights made from the deck of a ship under way. It is important to recall these events, (although I am afraid I am missing more than I record) for it was at Eastchurch that most of the progress with float machines was made, the firm responsible being Short Brothers. The Admiralty was, somewhat grudgingly perhaps, sympathetic. They appointed Lieut. R. Fitzmaurice to carry out wireless experiments. This, of course, was long after work in this department had been carried out on Salisbury Plain with Bristol machines. At Eastchurch the Hon. Maurice Egerton was the first to use wireless. He fitted an apparatus in his Short biplane. But M. Rouzet, in 1912, brought from France an engine-driven wireless set which was fitted to a triple tractor Short biplane, and with it transmission to thirty miles was carried out.

At Eastchurch bomb-dropping from aircraft was experimented on the initiative of the Air Department of the Admiralty under Captain (now Rear-Admiral) Murray Sueter, and although a great many people imagine that the War started everything as regards aircraft, it is nevertheless the fact that in 1913 experiments were carried out at Eastchurch in connection with hostile airship destruction, whilst a little before the War Lieut. Clark Hall experimented with machine guns mounted in aeroplanes. Much other work was accomplished, and some of this is dealt with in other chapters.

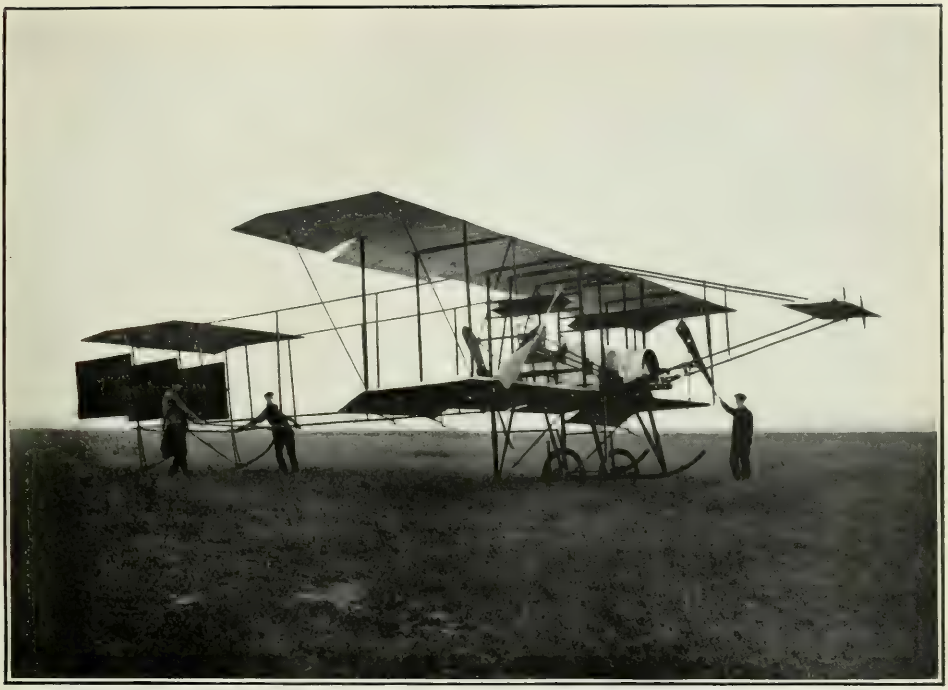
One of the greatest achievements of 1913 was the invention, or rather the completion, of the air-speedometer by Mr. Ogilvie and his little staff at Eastchurch. This saved many lives by preventing stalling. Prior to this, great insistence had always been made on the use of a piece of string tied to a strut, its end free to show the direction of the air flow; and there were countless experiments, chiefly by Mr. Ogilvie, with various forms of speed indicators which culminated in the instrument which is still in use.

Further, Mr. Ogilvie's full-scale stress work and his table of strut sections, so much used in the early days, are examples of the technical work at Eastchurch.

Mr. C. R. Fairey was Horace Short's chief engineer for a long time, and Mr. (now Squadron-Leader Maurice Wright), and Mr. F. G. T. Dawson (both of whom are with the Fairey Company) were also at Eastchurch. But Horace Short was the inspiring genius. Not only his development of the seaplane, and other types, but the sense of responsibility he had towards pilots, and the exacting care he took in aeroplane construction, helped to ensure the freedom of Eastchurch from fatal accidents in those days. He certainly laid the foundations of the British seaplane industry.

The mention of Squadron Leader Maurice Wright reminds me that at Eastchurch he flew the Ogilvie-Wright glider. He has been busy flying ever since, and has probably flown more different types than any other living man: possibly nearly 200. He was testing for the Service during the war and, since and is prominent in all developments.

As already mentioned, at Eastchurch many novelties were introduced—the first twin-engined machines were produced by Short; the first all-metal machine with tubular structure; in 1911 a nacelle type with a quick-firing gun; in 1913 a seaplane with foldable wings used by Mr. McClean in his flight up the Nile and also used at Jutland; the first streamline wires (a suggestion of Mr. Fairey) were drawn by Messrs. J. & H. Grevener, of London, and put on Mr. Ogilvie's Wright biplane. This was in 1913: streamline wires, by the way, were said to



Twin-engine Biplane with three Airscrews.
Short Bros. 1911 (built for Sir F. McClean)

have been introduced by the Royal Aircraft Factory. Much of the early stress work was done at Eastchurch. Mr. Harris Booth and Mr. Fairey were constantly at work on these problems, and it was Mr. Fairey who pointed out for the first time, à propos of the Montrose accident, that the correct safety factor of a machine was the square of the speed range. This too was claimed by the Royal Aircraft Factory, but disputed by Mr. Ogilvie on the Accidents Committee.

CHAPTER III

EARLY DAYS AT BROOKLANDS

THE "Blue Bird" was the aerodrome restaurant, over which Mrs. Billing presided. There gathered weary pilots (who in many cases were their own mechanics) advisers of all kinds, theorists, and various odds and ends, at lunch and tea-time discussing their experiences, their projects, and ways and means.

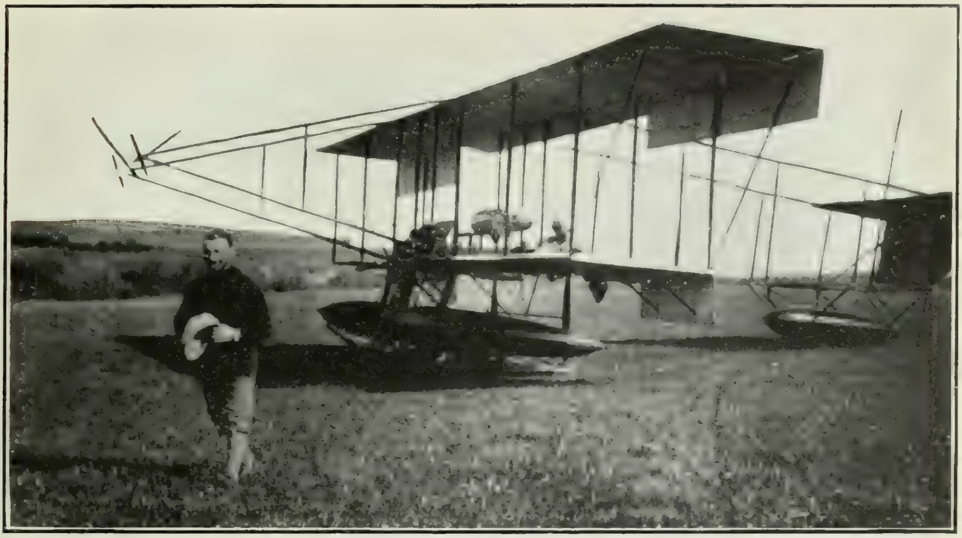
On hot days in the summer the "Blue Bird" was infested with wasps, and "intrepid airmen", to use a very irritating cliché of the popular press, would arm themselves with petrol syringes. Jam attracted the wasps, and the jam dishes were accordingly the target for streams of petrol. The dead or sleeping wasps were picked out, and after a few minutes the jam seemed to taste little the worse to hungry men!

The sewage farm at Brooklands was a magnet to clumsy landers or to machines with faltering engines, and it was said no man became an aviator until he had taken at least one toss in the sewage farm. Tyros taxying on almost unmanageable machines over the ground, trying to take off, would find their mount yawing irresistibly towards the sewage. It certainly was very queer. Coming in to land many a novice cut off his engine too soon and failed to clear the mess. There was a theory that the air over the sewage farm interfered with combustion in the engine, or else detracted from the lift afforded by the air. One would have thought it would give more lift!

There was always fun at Brooklands. On the occasion when a big public subscription for the creating of air-mindedness was proposed a list was posted up in the "Blue Bird". A wag headed it by writing the name of Mr. R. F. Macfie, whose donation was "a stick of chalk." Then came,

DONOR	GIFT
The German Emperor	The Air
The Daily ——	Permission to use the air.

Few of us escaped toll, and I forget what the others or my own gifts were; and perhaps even if I could, I would not remember.



Short Biplane with Flotation Bags,
after flying off H.M.S. Hibernia.
Commander C. R. Samson.

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Early Days at Brooklands

On arrival at Brooklands one's eyes would first look anxiously over the field to see whether any wrecks were strewn thereon, and I remember on more than one occasion I arrived there to hear distressful news.

It was probably because aviation was really dangerous that the flying fraternity, by some psychological reaction, was so indomitably cheerful. They had to be; and they were curiously unconscious of the fact that they were the pioneers in a splendid enterprise. Some of them became famous, and are famous to-day and responsible men in the new industry. Some fell by the wayside, martyrs in the cause. Some having spent all their means lost heart at length, although the work they did was not without value to the survivors.

I think the first arrival at Brooklands was Mr. A. V. Roe, who was there in the winter of 1907 waiting for a 24 h.p. 8-cylinder Antoinette, promised him on loan; but before it arrived (June 8) aviation had become unpopular with the authorities and he was asked to go elsewhere. He returned later. In those days he was quite an expert flyer. True, he had one of the soundest-designed machines of the day, and his turns on it used to astonish and delight the unhappy possessors of certain other British-made, or even of foreign, machines.

The late Sir Walter Raleigh said of the community at Brooklands "it was a society like the early Christians; it practised fellowship and the community of goods." As a matter of fact, I often saw one experimenter borrow a propeller or some other vital part from another. They would try propeller after propeller without much reason for the change except that "it might do a bit better"; and often it did, for no explainable reason. Of course the time soon came when the relation between the pitch and diameter of the screw and the power and the number of revolutions of the engine began to be understood, and before 1911 working formulas were obtainable, and the propeller manufacturer appeared. Mr. Dashwood Lang was the first British propeller manufacturer on a specialised big scale. He was always the life and soul of the party, for he is a born comedian.

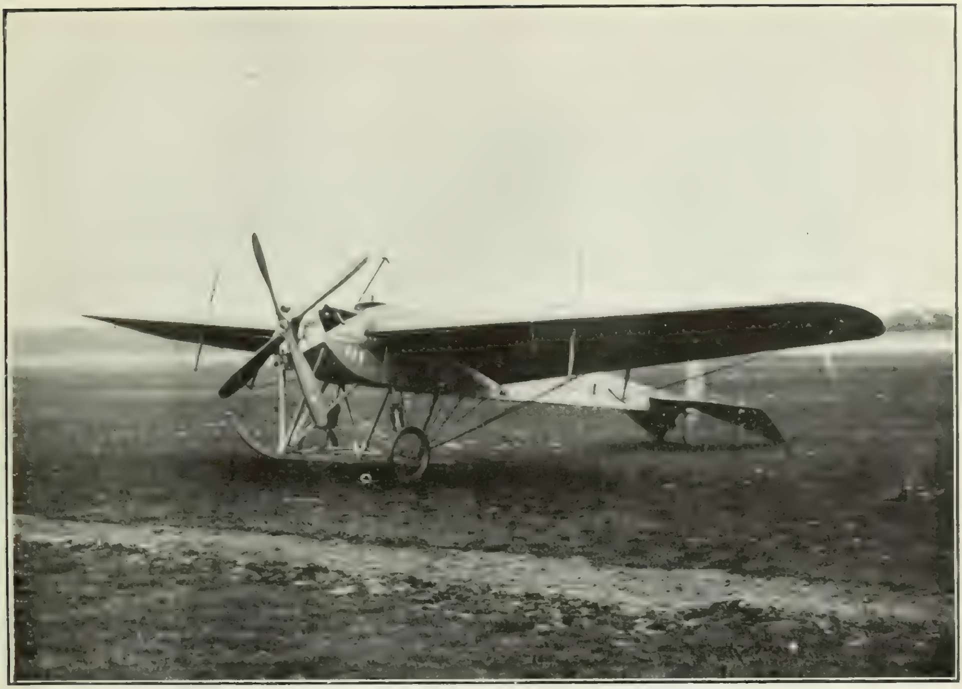
Mr. E. V. Sassoon was one of the leading personalities at Brooklands, and notorious for his amazing landings. One of the machines he flew was a Blériot Sociable, or side-by-side monoplane, known as the "Big Bat". Mr. Sassoon, who suffered from very poor sight, nearly always misjudged his landings; either he flattened out too soon and came down flop from twelve feet or so to the detriment of the undercarriage, or else he "thought the ground was farther on" and hit before he flattened out.

One of the first Brooklands men was the Hon. Alan Boyle with his Avis monoplane 25 h.p. Anzani, a three-cylinder fanwise engine which seemed never ready to give full service, and in those days seldom ran for more than about five minutes, and then got overheated. The owner slept in his shed at Brooklands in order to catch the few minutes of calm at dawn. The Hon. Alan Boyle lived the life of a Bohemian mechanic, sharing a shed with Sir Maxwell Monson, and practically living a camp life, their mechanic doing the cooking. Pilots then used to watch the air for the least indication of movement which would make flying risky. Gradually, however, they became more venturesome and did not wait for the flag to hang motionless at the mast-head or for the cigarette smoke to ascend vertically.

Mr. Charles Lane also had a monoplane, one with a curious tail, a fixed cambered surface with an elevating plane above it. This machine flew quite well.

Then there was the late E. V. B. Fisher, a very striking personality, with the face of a poet, clear white skin, large dark eyes, and a quantity of fine black hair. For a period of more than two years he was in the forefront of flying and of discussion, and he knew, more than most, what he was talking about. He brought more than the average courage and dash to aviation, and his knowledge of the theory of flight was extensive. He was a keen student, and devised various minor improvements and accessories. One day in October, 1911, flying a Vickers monoplane with a passenger, Mr. Johnson, he had a "sideslip," and before he could recover balance the machine struck the earth and was wrecked. Fisher was injured and was for several days unconscious, but his passenger escaped. Fisher had previously had a fall with his Hanriot monoplane, the machine on which he took out his certificate. The accident in which poor Fisher was killed will be dealt with in the chapter on casualties.

Probably he had not the robust physique necessary for constant flying. He was rather of the student type. That does not mean that he was not a skilful pilot. Far from it. But for him, as for most people who have experienced it, aviation made an irresistible appeal. He was pathetically disconsolate when, through bad weather or when his "bus" was out of order, he was unable to fly. He was an old Tonbridge School boy. Tonbridge, by the way, produced several of our first pilots.



FLANDERS MONOPLANE

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The late Edward Petre (known as "Peter the Painter") was at one time associated with Mr. Howard-Flanders. He showed a monoplane at Olympia in 1910, a machine with the engine in front but the propeller in the back. The tail plane was fixed, but the main planes were adjustable as to angle of incidence. This machine was the work of "Peter the Painter" and of his brother, Mr. H. A. Petre, who soon became known as "Peter the Monk." Both were pilots, and "the Monk" has been flying constantly ever since. Also he is on the Committee of the Royal Aero Club. He and Captain G. de Havilland (No. 53) and Mr. F. P. Raynham (No. 85) are "early tickets" still flying; and Air Commodore J. G. Weir (No. 24) was flying a short time ago.

Edward Petre was a very hard worker, and a most cheery soul. His first flights were made on a monoplane which he and his brother and Mr. Howard-Flanders made up out of the old Neale "Pup" and a 24 h.p. E.N.V. engine. After that they made several flights on Mr. Howard-Flanders' 60 h.p. Green monoplane. Edward Petre then left Mr. Howard-Flanders to join Mr. Handley Page, and got his "ticket" on one of the automatically stable monoplanes. He returned to Brooklands and flew the Martynside monoplane. On Christmas Eve, 1912, he started off from Brooklands at about 9 a.m. to fly to Edinburgh, a big flight, especially for a pilot of comparatively little experience. The weather had been very unsettled, and there were signs of a gale. Just after noon the gale commenced, and it struck Petre in the afternoon near the coast of Yorkshire. To avoid being blown out to sea he was compelled to land "down wind" at Marske. No monoplane of that date would withstand such treatment, and it broke up. Petre was killed, and aviation lost one of its pioneers.

Mr. Robert F. Macfie, another of the Brooklands stalwarts, looked like becoming one of the world's leading aeroplane designers. He is of Scottish descent, but was born at San Francisco. He underwent five years' training at the Royal Naval Engineering College, Keyham, but afterwards went in for engineering projects in various parts of the world, the sugar industry being one that he gave much attention to, and in which he obtained a lot of experience in handling men as well as in engineering.

At the beginning of 1909 he returned to England, but immediately proceeded to France to study aviation. He witnessed flights by Wright, Farman, Delahaye, Latham, and Blériot. He then set about building an aeroplane himself at Fambridge, Essex. The machine, a monoplane fitted with a 35 h.p. J.A.P.

engine, was completed in six weeks, and after a few alterations, made a short flight. After about a month, during which he had four smashes, Mr. Macfie left Fambridge and looked about for another flying ground.

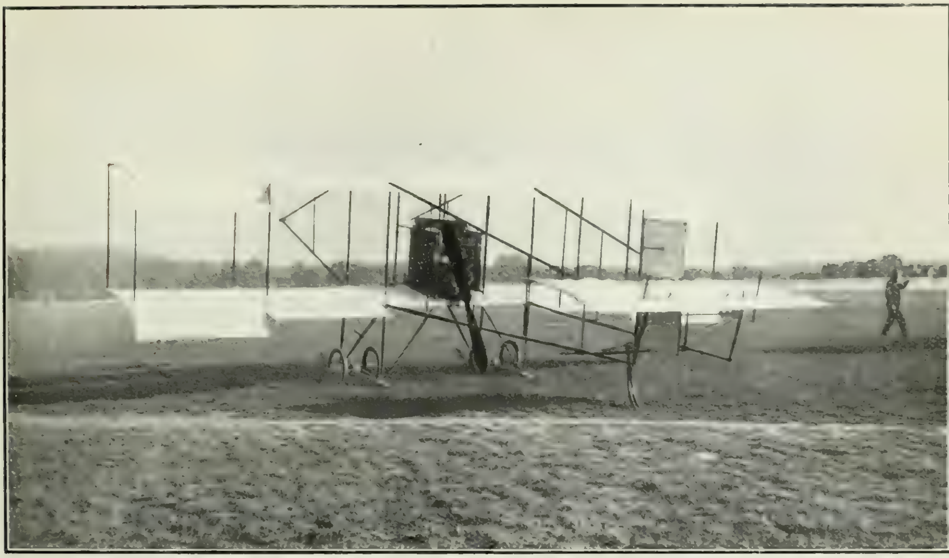
In November he took his machine to Foulness Island, where he stayed three weeks, but owing to bad weather was only out twice, and had two bad smashes, one through running into a post, and the other through being upset by a gust of wind. He was ordered off the sands by War Office Officials; and another search for an aerodrome began, the machine being taken at night to the Kursaal, Southend, an adventurous journey during which it rained all the time; the machine got stuck in the mud, and it took five horses and seven men to extricate it!

Eventually Mr. Macfie received permission to use the aerodrome at Pau, and was also invited by the Bordeaux Aero Club to use the Croix d'Hins aerodrome; but, unfortunately, the ground was far too soft and wet, hopeless from a flying point of view. He spent some more time in France trying to arrange for accommodation at some other suitable aerodrome, but without success, and he returned to England.

He then began building a machine at Portholm, near Huntingdon; this was a biplane designed for a 60 h.p. J.A.P. engine, but as the engine was not forthcoming the original 35 h.p. was fitted and short flights were made. Owing to permission to use Portholm being withdrawn, he transferred to Brooklands, where he did straights and quarter-turns, but the machine was too under-powered to do circles. Mr. James Radley tried this machine and took it to Wolverhampton, and it was altered into a Farman type at his request. It returned damaged by the weather, and then got partially burned, and was reconstructed on Mr. Macfie's design.

Mr. Macfie went into partnership with the late Major J. Valentine, known to all at Brooklands as "Jimmie", who provided a 50 h.p. Gnome; and with this engine fitted both Valentine and Macfie got their "tickets" (Nos. 47 and 49 respectively). I remember the heavy weights tied on the front skid of his machine to make up for the Gnome engine being lighter than the engine for which the aeroplane was designed.

Mr. Oscar C. Morison, a Brooklands star performer at that time, flew the machine. It was his first effort on a biplane, and a very successful one till the time came to descend, when he shut off his engine without dipping the nose, as was necessary with the old biplanes with heavily-loaded tails; the result was a "pancake" into the middle of the sewage farm.



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MACFIE BIPLANE

The Macfie machine was notable for many practical details, the product of its designer's inventive mind, and many of these became standard practice afterwards. Mr. Macfie was instrumental in introducing to aviation several men who played a part in the early development of the industry in this country; the late Eardley-Billing, Mr. E. G. Jolly (afterwards with Mr. Radley), Mr. Trott (for many years since with Martynside), Mr. Anderson (afterwards with the Universal Aviation Co., the Blair Athol Syndicate, and Short Brothers), Mr. Muller (who became works manager at Vickers' Weybridge works) among others; most of them gave up good jobs to share the rough life and scanty pay that was the lot of the pioneers of aviation.

Mr. Macfie's next effort was a small biplane for the Circuit of Britain, designed for a speed of ninety miles per hour, which would have easily beaten any other machine competing. Unfortunately, the 100 h.p. A.B.C. engine was not delivered in time, and the flying power of the machine was never tested.

When the War broke out Mr. Macfie obtained a commission in the armoured car section of the R.N.A.S. He had long been a student of caterpillar traction in the United States, and was impressed with its possibilities. He evolved early in 1914 a design for a caterpillar tractor on very much the same lines as the war chariots which afterwards became known as "Tanks", and he also suggested the very tactics that were put into practice at Cambrai, in November, 1916. He was given £500 for his ideas, which it was stated "were never brought to the notice of the actual designers of the tank!"

I have been able to refer to only a few of Mr. Macfie's numerous activities. A man of restless energy and inventive mind, he is always full of schemes, and can expound them with uncommon lucidity. He comes into the Brooklands chapter because he was chiefly identified with that aerodrome. If it were possible to follow a perfectly neat method of classification there would be a chapter for designers, another for pilots, and one for every other department. Regard for chronological order would make even so simple a plan difficult to carry out. But there are so many other aspects, and Brooklands and other places made so much history, that inevitably reference to any particular person may be found scattered all over the book. The index may help.

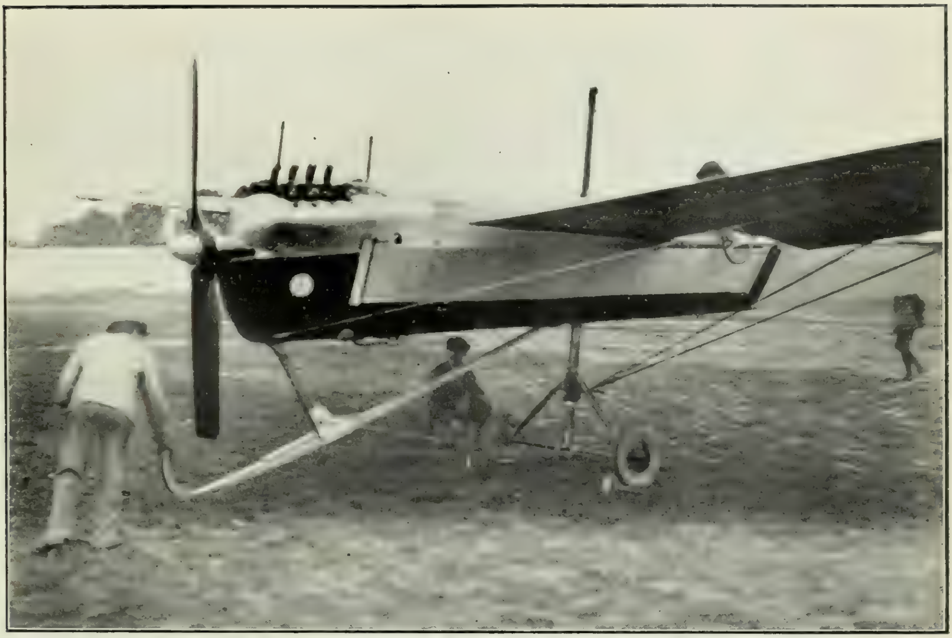
Another of the pioneer designers associated with Brooklands was Mr. G. H. Handasyde. Mr. H. P. Martin and Mr. Handasyde were the first to occupy a shed at the aerodrome, and they remained there until long after the War. Brooklands has changed much since Martin and Handasyde first occupied the shed that afterwards became the "Blue Bird". Mr. Handasyde spent two and a half years on the Atlantic, and, eventually settling down, became manager of the Edinburgh Car Company. From Edinburgh he came to London and took charge of the garage of the London General Omnibus Company, which had just been formed. After spending seven months there he joined Friswells, and then went to Mass Cars, where he remained two years. It may be mentioned incidentally that he was the owner of the third petrol car in Great Britain—a three-wheeled Benz. This varied experience with motor-cars was, of course, of great value to him when he tackled the problem of aviation and the aero engine.

In 1908 he began work with Mr. Martin (of Trier and Martin Carburettor, and other engineering fame), the first machine they built being a small monoplane fitted with a Beeston-Humber engine and a three-bladed metal propeller. This was erected in the ballroom of the Old Welsh Harp at Hendon. When it was taken out for trial in a neighbouring field, and the engine started, the propeller tore apart and lifted the motor clean out of the machine, and thus ended the career of the first of the long line of Martinsydes.

The "firm" moved from the Welsh Harp to the north of England, and built another aeroplane, which was wrecked by a storm which blew down the tent where it was kept. Then they went to Brooklands.

The firm of Martin and Handasyde grew up from this small beginning to the great organisation it became. Associated with them in those early days was Mr. H. A. Petre. They experimented with different types, including a small monoplane with a J.A.P. engine, but the most characteristic type of those days was a monoplane of big span and light loading, with triangular fuselage, and wings with king-post bracing tapering to the tips, and with a marked "wash-out." It bore a superficial resemblance to the Antoinette, which was increased by the fact that the Antoinette engine, in which Mr. Handasyde had great faith, was used; but there were very important differences. They were the two most beautiful aeroplanes ever built. It is characteristic of Mr. Handasyde's versatility as a designer that his most successful machine during the War should have been a "Tabloid" biplane, which was about as great a contrast as possible from his pre-War monoplane.

After the Antoinette engine and aeroplanes, a design for the Gnome was built, and altogether up to the time of the War some forty machines were built, and these were flown by some of the best known of the pre-War pilots, Mr. Oscar Morison,



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An early Martinsyde Monoplane

Graham Gilmour, E. Petre, Mr. F. S. Barnwell, G. Blatherwick, R. R. Skene, Gordon Bell, and others.

The War brought prosperity to Martinsyde as to other aeroplane makers, their most successful machine being the Martinsyde Scout, which was produced just at the right moment to play a great part. This machine had the finest performance during the War in climb and speed at height, besides having a slow landing-speed. Since the War the Martinsyde reputation was maintained by the famous F.4. The first London-Lisbon and Madrid-Lisbon flights were made with an F.4.—300 h.p. Hispano-Suiza, and the fastest London-Paris flight (in seventy-five minutes) was made by an F.4.—275 h.p. Rolls-Royce.

Mr. Oscar Morison was one of the earliest to take up flying. He had practised as an electrical engineer, and had long been a keen motorist. In February, 1910, he went to Pau and learned to fly on a Blériot–Anzani, but failed to get his "ticket" owing to repeated engine failure. Had he done so, he would have been in the first half-dozen British certificated aviators.

He brought his machine back to England and went to Brooklands, where by the summer of 1910 he was one of the foremost in that little colony. In September, 1910, he purchased a 50 h.p. Gnome–Bleriot, taking delivery of it at Issy-les-Moulineaux. After more or less mastering it he brought it to Brooklands. At that time the 50 h.p. Gnome–Blériot was looked upon as a machine of fearsome speed and power, and Morison's skilful and nonchalant handling of it, and the speed at which he climbed, were much admired. He was awarded his "ticket" in December, 1910, with the distinction that the actual carrying out of the tests was dispensed with in his case. In February, 1911, he ascended to 6,000 feet, which was then a record for Brooklands. His first attempt to fly a biplane was on Mr. Macfie's machine, and, as already mentioned, it ended disastrously in a "pancake" in the sewage farm. The aviator emerged unhurt and, as usual, unruffled, although his aeroplane was more or less in pieces.

On February 17, 1911, he flew to Brighton and landed on the shingle with the result that he damaged his chassis and broke his propeller. The remains of the propeller, suitably inscribed and with a portrait of Morison inset, are preserved in the smoking-room of a local hotel. This flight—the first ever made to Brighton—created a lot of enthusiasm, and Mr. Morison was entertained to dinner by the Sussex Motor Yacht Club and presented with a gold cigarette case as a souvenir. A few days later, when the machine was repaired, it was assembled and erected on the lawns at Hove, from which Mr. Morison took off and landed at Shoreham, where he stayed and gave exhibition flights.

In March, 1911, he entered into an arrangement with the British and Colonial Aeroplane Company, under which the firm supplied one of their "box kites", mechanics, and a shed, and Mr. Morison took up passengers for them. This was continued till May, when he went to France and purchased a Morane (then the fastest machine), installed his 50 h.p. Gnome engine, and entered for the Circuit of Europe Race. Half-an-hour after the start engine failure caused a forced landing, which was made in the garden of a house. There was strong suspicion of "sabotage" on this occasion; and he had already had one experience of finding his petrol cans filled with water.

As soon as the Morane was repaired Mr. Morison flew it from Issy-les-Moulinaux to Calais and thence to Shoreham the same day, and the following day on to Brooklands; this was in July, 1911. He continued flying his Morane until October, during which time he did many cross-country journeys and had several crashes, through all of which he came unscathed; and he must certainly have held the record in that respect up to that period. His landing places were many and curious, and included a tree. Another machine on which he did a good deal of flying was the big Martinsyde monoplane. About this time he reversed the more usual process and took up lighter-than-air work in place of heavier-than-air. Altogether he made sixteen balloon trips.

Mr. Morison offered his services when the War broke out, and took up flying again after three years' interval, but it was eventually realised that his engineering talent could be used to more advantage as an equipment officer. He saw service with the R.N.A.S., R.F.C., and R.A.F., and was at one time in charge of the aero engines at Coudekerke (when I renewed his acquaintance), a position he filled with conspicuous ability, though he was not the type of man to take very kindly to the red-tape of service life.

Mr. E. V. Hammond was another of the very early experimenters. He began in 1906, at which time he was trying to solve the problem of the helicopter, and the results of his investigations are to be found in engineering literature of the time. He was one of the first Brooklands men, and he made two or three aeroplanes, but never achieved a conspicuous success. In *Aeronautics*, in 1908, there is a letter from Mr. Hammond in which he refers to the fact that slow-moving propellers will give better results in proportion for the absorption of a given horse-power than fast-running propellers absorbing a much greater horse-power. After pointing out the reason for this, and also the difficulty of employing very big propellers, he said:— "By using a large number of very small propellers revolving at a great number of revolutions per minute the speed in miles per hour equals that of one large, slow-moving propeller, and by reason that their individual thrust is small they can be so lightly constructed that we can obtain the whole aggregate area of our large propellers for about two-thirds the weight."

His great aim and object in those early days was to endeavour to evolve a form of machine with an ample factor of safety but capable of flying with low horse-power; a form of "flying motor-cycle," in short, a craft capable of flight, as cheap to construct and easy to handle as the motor-cycle, and using the same type of engine. Years of hard work dispelled the dream, and with it faded his hopes of commercial success, for he came to the conclusion that the stereotyped form of aeroplane (as we know it to-day) could never be a commercial success.

Captain C. Howard Pixton was one of the first test pilots, although, in a sense, all the early aviators were test pilots. By the common standards of newspaper publicity Captain Pixton's name was chiefly associated with the British victory in the Schneider Maritime Trophy contested at Monaco in 1914; but his services to aviation were far more important than the winning of a sporting event. He was extraordinarily painstaking, and many stories are told of his careful regard for small details. Many an airman has had reason to deplore carelessness over seemingly trivial items, and time and again a race has been lost by failure to keep tally of the laps flown. Captain Pixton was not of that class: he would have a card in the cockpit, and in the card a row of drawing pins. Punctually, on finishing each lap he would pull out one of the pins. Mr. T. O. M. Sopwith, than whom none knows better how to choose men, employed Captain Pixton, and afterwards made an equally good choice in the late Harry Hawker.

Captain Pixton's first aeronautical experience was with Mr. A. V. Roe, whom he joined at Brooklands in June, 1910, as a working pupil—i.e., he paid a sum to cover tuition and worked in his spare time in the sheds. He went with Mr. Roe to the 1910 Blackpool meeting, and in September went from there with him to the Boston (U.S.A.) meeting. They returned to Brooklands at the end of October, and Captain Pixton finished his tuition, getting "ticket" No. 50, on the Avro triplane.

In May, 1911, he competed in the Brooklands-Brighton race, arriving last owing to losing his way and landing at Plumpton racecourse. This was his first cross-country journey, and the compass fitted was entirely unsuited for aircraft, the card revolving round at such a rate that it made him feel dizzy. As a sidelight on the way things were done in those days the following incident may prove of interest: As he was starting up at Plumpton the village helpers pressed heavily on the fuselage, breaking the rudderpost in half. However, it was quickly repaired by cutting a stake out of the hedge and making a splint for the damaged part! A day or two later Mr. Pixton made a really sound job of it by contriving a new rudderpost out of a broom handle!

About the middle of 1911 he joined the British and Colonial Aeroplane Company, and was in charge of their school at Brooklands for a short time, and later in the year was transferred to their Larkhill sheds. During 1911 he entered all the Brooklands competitions, and won most of them. He also gave remarkable exhibitions of the possibilities of wind fighting even on the slow machines of those days. He won the Aggregate prize at the end of the season, and the "Manville" Passenger Carrying Competition, partly on the Avro biplane partly on the Bristol "Box Kite." In July, 1911, he competed in the Round-Britain race, but only got as far as Spofforth, near Harrogate, where he crashed, and was put to bed for about a week.

The following year he spent chiefly in going about Europe demonstrating Bristol monoplanes. In January, in company with Mr. (now Wing-Commander) H. R. Busteed, he went to Madrid with a 70 h.p. Gnome-Bristol biplane and a 50 h.p. Gnome-Bristol monoplane, and flew before the King of Spain. He returned home at the end of February and went for five weeks to Milford Haven, where he experimented with a Bristol seaplane; and from there went to Doeberitz, near Berlin, with a Bristol monoplane, and after that to France to test another at St. Cyr. Then he returned home to compete in the Military aeroplane trials on an 80 h.p. Gnome-Bristol monoplane, winning third prize and incidentally doing a record wind flight. Immediately the trials were over he went to Doeberitz again, from there going to Halberstadt to open the German "Bristol" Works and pass a number of officers for their tickets. He stayed a month or so, and was then relieved by Mr. Ronald Kemp.

Early in January, 1913, he went to Madrid to demonstrate the 80 h.p. Bristol monoplane. On this visit he took up the

Infanta for a number of trips. Returning to Larkhill at the end of March, he settled down to experimental school work and tested machines for various foreign powers. In November, 1913, he left the Bristol firm and joined Mr. Sopwith.

In 1914 Mr. Pixton concentrated on Sopwith seaplanes at Southampton, and Calshot, and Grain, and passed a number of seaplanes for the Greek Government, also a "Bat"-boat for Germany. In April, 1914, he went to Monaco and won the Schneider Cup, after which he started flying the famous "Tabloids", and entered the Aerial Derby on one, but landed near Croydon owing to fog and a leaking petrol pipe.

When War broke out he was first of all engaged in passing through their tests seaplanes at Calshot and Grain. In November, 1914, he joined the A.I.D. at Farnborough, and got a commission in the R.F.C. in April, 1915. Later on he returned to Avro's, and after the War did a lot of work for that firm in their campaign to make flying a popular pastime.

Another Avro pilot was Mr. (now Major) S. V. Sippe, who while serving for four years with the British Westinghouse Company, in the electrical and mechanical departments, began to take an interest in flying. He built a metal machine in 1910, but it was too under-powered to fly, though he just succeeded in getting off the ground with it; at least the onlookers so averred although Sippe himself was not quite sure of it.

He was the first in England to employ steel and oxy-acetylene welding in the construction of aeroplanes.

He went to the A. V. Roe school at Brooklands to learn to fly in the summer of 1911, but for some weeks there was no pupil's machine available, owing to crashes, and during this time he acted as manager for Mr. Roe. He eventually got his "ticket" on an Avro biplane in January, 1912.

In April, 1912, he was carrying out experiments at Barrow, with an Avro-35 h.p. Green, which was fitted with floats and made into a seaplane for Commander O. Schwann.

Mr. Sippe then started flying for the Hanriot firm, and took part in the first Aerial Derby on a 50 h.p. Gnome-Hanriot, but was forced to land at Merstham owing to engine trouble. After that he went to France to test a 100 h.p. Hanriot for the Gordon Bennett, and was one of the first British pilots to handle a high-speed racing machine. In the Military Trials on Salisbury Plain in 1912 he was flying this type.

He joined the British and Colonial Aeroplane Company in September, 1912, and was at Larkhill in the autumn testing the Bristol monoplane (a machine designed by M. Henri Coanda.) Early in 1913 he went to Turin to carry out delivery tests of Bristol monoplanes for the Italian Government, and from there proceeded to Milan to superintend the construction of fourteen 80 h.p. Bristol monoplanes for the Italian War Office. While there he took part in the Italian Military Aeroplane Competition. On November 6th, 1913, he was appointed a probationary Sub-Lieutenant in the Royal Naval Reserve, He was back in Bristol at the beginning of 1914, but went out with Mr. Farnall Thurstan to fly at the Vienna meeting held in the June just before the War.

When War broke out he was at once sent out to Belgium with the Royal Naval Air Service, and took part in some of the early bombing raids, including the famous one, led by Commander E. F. Briggs, when the Zeppelin sheds at Friedrichshaven were bombed. Commander Briggs was forced to descend owing to engine failure, and was taken prisoner.

On leaving the Service, Major Sippe became associated with Short Brothers.

Captain (now Major) Hugh Watkins' first ascent was in a balloon. It was in May, 1910, and he went up from the Crystal Palace with the late Air-Commodore (then Captain) E. M. Maitland as pilot; he had two more trips with Maitland, and afterwards many ascents, piloting himself. On one occasion he took up the late well-known balloonist and parachutist, A. E. Gaudron, and a lady parachutist, Miss Dolly Shepherd, to make a double parachute descent. There was a strong wind blowing at the time, and when they got off, the lady and her parachute broke loose and fell among the crowd, causing much alarm, but no great damage.

In September, 1910, Captain Watkins took over the Howard-Wright biplane, with E.N.V. engine, belonging to Maitland; the latter had crashed on it at Larkhill, but had it repaired. Captain Watkins taught himself to fly on this machine at Brooklands, and carried a great number of passengers on it; indeed, the first time he flew a circuit he carried a passenger (Mr. W. O. Manning). This recalls the tale of the nervous passenger who became alarmed at the evolutions his pilot was doing and said to him, "Please be careful, you know it's my first flight." "And mine, too," replied the pilot.

Among Watkins's passengers were Mr. A. V. Roe, Mr. R. C. Kemp, Mr. T. O. M. Sopwith, Gordon Bell, and myself.

Captain Watkins took the machine to Shorncliffe to compete for the Baron de Forest prize, but owing to the heavy load of petrol that had to be carried, and the down draught over the cliffs, he was unable to get off. Mr. Grahame-White and others who were there found the same difficulty. One night, while they were waiting at Shorncliffe, a gale sprang up; Captain Watkins's machine was housed in a shed belonging to the Sappers, and all the military turned out to assist, and there were some two hundred of all ranks from brigadier to drummer-boy hanging on to it most of the night to prevent it being blown away.

Captain Watkins was his own mechanic, and a very capable one, too, and it was largely owing to the care that he took of his machine that he was able to get through the amount of flying that he did. And in those days the keeping of a machine in flying trim was a different matter from what it is now.

In April, 1911, the Howard-Wright was disposed of to the Air Battalion, and Captain Watkins flew a Gnome-Farman, and after that another Howard-Wright with E.N.V. engine, the property of Mr. Dare. The next aeroplane he flew was a monoplane, the Vickers R.E.P. and he went out to Australia with the intention of piloting for Dr. Mawson's expedition to the South Pole. This machine was the first aeroplane produced by the Vickers firm, which had acquired the British rights of the R.E.P. from M. Esnault-Pelterie, who was one of the most successful and original of the early French designers. The Vickers monoplane preserved the main feature of the R.E.P. as a basis whereon to continue improvements in design and construction. It was practially an all-steel machine, built up of steel tubing, and its characteristic feature was a deep, squat body, the forward part of which was diamond-shape. The engine was a five-cylinder, fan-shaped, air-cooled, 60 h.p. R.E.P. For the expedition to the South Pole the aeroplane was to have been fitted with skids for landing on the snow. It was, however, not destined to reach the Polar regions, as while flying it at Adelaide Racecourse, with Mr. Frank Wilde as a passenger, it was caught in eddies and crashed, with disastrous results to the aeroplane, though, fortunately, the occupants were not badly hurt. Later on, returning to England, Captain Watkins was injured in an accident while flying the Spencer biplane at Brooklands.

Confusion often occurred owing to the presence at Brooklands of another pilot of the same name, Lieutenant (now Squadron-Leader) H. E. M. Watkins. He learned to fly at Brooklands with the Bristol School, and accomplishing this very quickly, and without the slightest mishap of any kind, was given a discount on the tuition fees. He was one of the numerous pupils in one or another of the Services who received a Government grant of £75 to cover the cost of tuition. Squadron-Leader Watkins, by the way, was engaged with Flight-Commander

Cull and Flight Sub-Lieut. H. Arnold in the air reconnaissances which disclosed the position of the German warship *Konigsberg* in the Rufigi River, East Africa.

Another Brooklands pupil was Sub-Lieutenant (now Group-Captain) A. W. Bigsworth. Also Sub.-Lieutenant (now Wing-Commander) J. R. Smyth-Pigott and Sub.-Lieutenant (now Wing-Commander) F. E. T. Hewlett, who learned to fly at Brooklands on a Farman biplane belonging to and flown by his mother.

The late Captain C. Gordon Bell was one of the leading Brooklands pilots. In his days it was an event for a pilot to pass from one type to another, but Gordon Bell flew one and all, Short, Borel, Hanriot, Deperdussin, Martinsyde, B.E. and others.

He flew that queer, circular plane with which Mr. Tilghman Richards and the late Cedric Lee were associated, and he crashed it at Shoreham. On June 13, 1913, he had an accident at Brooklands, and escaped with his life by a miracle. He had flown a Martinsyde monoplane—Austro-Daimler engine, from Eastchurch, but before landing at Brooklands he indulged in some low altitude stunting over the sheds, and caught the ground with a wing-tip. His passenger, Lieut. J. R. B. Kennedy, R.N., was killed, and Gordon Bell had a broken skull. From this he made a marvellous recovery, walking and flying with a gash in his cranium, of which he was proud in a queer, humorous way. Despite repeated crashes he never lost his nerve, and remained fearless, not through ignorance but in full knowledge of the risks he ran. Indeed, few men knew so much about the scientific side of flying as he, and his opinion as a test pilot on any knotty point of design was often sought. His certificate was No. 100, July 4, 1911, on a Hanriot monoplane.

He was in charge of the Deperdussin school at Brooklands in the summer of 1911. He tested a machine for the French Army at Buc at the beginning of 1912, and in April of that year flew over Constantinople, twice across the Bosphorus, and once over the sea of Marmora; and he was the first airman to fly from Europe to Asia. He made many daring flights, and was ready to go up in almost any weather. On one occasion he was warned by the authorities at Brooklands to be more cautious. He went to France in May, 1913, to take over a Borel monoplane, and, as related elsewhere, I accompanied him, and flew with him to England, an eventful flight.

Gordon Bell had short sight and wore glasses, which he frequently dropped in the fuselage and had to grope for them, leaving the machine to itself. I can testify from personal experience to the awkwardness of losing one's glasses while flying, and although there is no objection to airmen flying with glasses it is highly injudicious for them to do so if they are more or less helpless without them.

Here I must recall the fact that on his first flight on a R.E.P. Gordon Bell got into a spin at 300 feet and did not get out of it until he was 100 feet off the ground. In the Military Trials in 1912 he flew the Martinsyde and the Deperdussin. He was killed on July 29, 1918, while testing a new machine in France.

I shall always remember Gordon Bell's drawl and stammer, and his ready invention of weird words and phrases, some of which became currency as aviation slang. He was a great personality at the Royal Aero Club, and many stories could be told relating to his innumerable interests, for he could relax from the ardours and perils of his calling and be as light-hearted as a boy. Here is a typical story. On one occasion he landed upside-down, mixed up with a tree, and an Army staff officer asked him vapidly:

"Have you had an accident?"

"N-no, sir," came the reply, "I-I-I always l-land l-l-like that."

When Gordon Bell joined the Royal Flying Corps Reserve he made a test flight on one occasion and was afterwards asked by Mr. Mervyn O'Gorman, Superintendent of the Royal Aircraft Factory, for his opinion.

"W-well, sir," was the reply, "If I c-c-c-could sp-speak as a c-c-civ-civilian for five minutes I could t-t-tell you."

Mr. O'Gorman begged him to speak freely and without constraint.

It is related that Gordon Bell took full advantage of this permission.

How many people remember there was a Humber monoplane? Mr. E. Keith Davies flew one at Brooklands before he became connected with the British Hanriot Company (whose machines, by the way, were known as "Henriettas.") He had a shed at Brooklands, and afterwards went to India to sell Humber monoplanes. I do not remember what success he achieved. Mr. G. A. Barnes was another Humber pilot.

Mr. Fritz Koolhoven, one of the best designers of aeroplanes in the world, who became even better known during and after the war, and who will go on to new triumphs, took his certificate on the Hanriot I think; but afterwards he flew the Deperdussin and a Farman. He was designer for the British Deperdussin Company, of which the late Lieut. J. C. Porte was the chief.

Lieut. Porte was one of our earliest fliers. He was in the Submarine Department of the Navy and, with a friend's help, he made a glider and practised on it at Portsdown Hill, Plymouth, as long ago as 1909; Then he made a monoplane on Santos Dumont "Demoiselle" lines. He flew in the Circuit of Britain (July 1911), but had an accident, apparently due to eddies in the air.

He suffered from very bad health, and for that reason left the Navy, and with Mr. Lawrence Santoni formed the British Deperdussin Company. Just before the war he was making ready for a flight across the Atlantic, and on the outbreak of war was placed in charge of the R.N.A.S. at Hendon. He became famous as the designer of the Porte flying-boat. Commander Porte succumbed to illness.

Among the aviators at Brooklands was Mr. Herbert Spencer, with whom I had many flights. He was a junior member of the third generation of the famous ballooning family. He had a biplane of his own design and construction, and taught many pupils and gave innumerable passenger flights. His machine was lighter than the average biplane of its class, and was faster than the ordinary Farman.

Hubert W. Latham, subsequent to the Blackpool meeting, flew his Antoinette monoplane at Brooklands and on one occasion crashed on to the roof of one of the sheds. He was unhurt.

One of the earlier figures at Brooklands was Mr. James Radley, who had flown a Blériot at Huntingdon. For some years he was prominent in British flying and at the Royal Aero Club.

Mr. D. Graham Gilmour, to whom references have already been made, also did a lot of flying at Brooklands when he joined the Bristol firm. He was a man who flew "with his head," and would have become a great test pilot.

The late James Valentine, who for long was one of the principal British aviators, although seen much at Brooklands was not confined to that part of the world. An old Alleynian, he was apprenticed to the L.B. & S.C.R. Loco Works on leaving school. He flew in the European Circuit on a Deperdussin, and was the only British entrant to finish the course as far as London. And in the Circuit of Britain he was the only British starter to finish in the time limit. He made a flying tour of Ireland in 1912. Almost the last time I saw Valentine was a chance meeting with him at the Admiralty during the war. Soon after he was engaged on a special mission, during which he had to undergo an operation, from which he died.

Valentine took his "ticket" on a Macfie machine in January, 1911, and soon came to the first rank of flyers. He flew from Hendon to Grisnez in June, 1912. He was much in France, and on one occasion flew a Bristol biplane round the Eiffel Tower with a passenger wearing a silk hat.

One of the pilots associated with the successful Bristol school at Brooklands was Mr. F. Warren Merriam, who trained hundreds of pupils, although he did not get his "ticket" till late in February, 1912. Always interested in motoring, he had his own little car in 1903. He was injured in January, 1914, while flying with a passenger who was killed. Like M. (now Major) Henri Jullerot, Merriam was a great instructor. He was my pilot in many flights.

Another Bristol pilot was the late Collyns Pizey, known as "Little Appy." The late H. R. Fleming, my fellow pupil, was known as "Big Appy." I believe the reason for these queer designations was Pizey's sunny disposition and the close friendship which existed between him and Fleming, who was twice his size. They may have been suggested by the popular Music Hall song of the period. I sometimes went up with one or other of them to "take the air". Collyns Pizey had a great spirit in his small body, and was a stout flyer with a sound knowledge of theory and mechanics. He had been an apprentice to the Bristol Tramways and Carriage Company, from which the famous aeroplane firm sprang, and he became assistant engineer to the aircraft offshoot, his first job being that of superintendent of construction. He took his "ticket", No. 61, on Salisbury Plain in January, 1911. He did a lot of cross-country flying and tours, and took part in the Circuit of Britain. Also he travelled much on the Continent as representative of the Bristol firm, and did some brilliant qualifying flights for the Italian Government in 1912.

On May 26th, while flying with a passenger at Larkhill, his machine caught fire and his passenger had to stand in order to avoid the flames. They managed to get down safely, but had no sooner got out than the petrol tank blew up.

In the course of his duties Pizey taught several German and Italian officers to fly; and in September, 1913, was chosen as Chief Instructor to the aeroplane branch of the Greek Navy under Rear-Admiral Mark Kerr, who was appointed to reorganise the Greek Navy. The Admiral was the first flag officer to become an aeroplane pilot.

Mrs. Hilda B. Hewlett, wife of the late Maurice Hewlett, the well-known author, was the first British lady to become a fully-fledged aviator, and also the first woman in this country to do a right-hand turn, and to reach the height of 100 feet. Mrs. Hewlett flew some hundreds of miles both by herself and as a passenger. She set up an aircraft factory at Brooklands, and ran a flight school in association with M. Blondeau.

The late E. W. Copland Perry, one of the Royal Aircraft Factory pilots, a brilliant and daring airman, did much flying at Brooklands on the Burgess-Wright, and was a notable personality. He worked with Mr. T. O. M. Sopwith at one time. He was one of the few men who secured his certificate on the Barber " Valkyrie " (September 12, 1911). Copland Perry was killed in an accident in France in August, 1914, his mechanic, E. G. Parfitt also losing his life.

In 1910 the flying at Brooklands was attractive because of the variety of machines in use. These included Blériot, Hanriot, Vickers, Howard-Wright, and Avis monoplanes, and Farman, Howard-Wright and Voisin biplanes. The flyers were good, bad and indifferent, and it was worth while to study all. There were thirty-nine sheds, and about forty machines. On a fine day the sky was apt to be crowded.

One or two examples of aeroplane races at Brooklands will help to give an idea of the progress attained at this period. The Whit-Monday, 1910, Aeroplane Handicap had an entry of fifteen, and the event, over a distance of about twelve miles, was divided into two heats the results of which were:

FIRST HEAT	AEROPLANE AND	ENGINE	TIME ALLOWANCE	
L. F. Macdonald	Vickers Monoplane	Vickers R.E.P.	3 min. 24 sec.	1
W. B. Rhodes Moorhouse	Blériot Monoplane	50 h.p. Gnome	2 ,, 36 ,,	2
E. Hotchkiss	Bristol Biplane	50 h.p. Gnome	10 ,, 24 ,,	3
M. Ducrocq	Hanriot Monoplane	50 h.p. Gnome (scratch)	0 ,,	
Lieut. J. C. Porte	Deperdussin Monoplane	50–60 Anzani	3 ,, 0 ,,	0
R. L. Charteris	Hanriot Monoplane	A.B.C.	0 ,, 24 ,,	0
H. Spencer	Spencer Biplane	50 h.p. Gnome	10 ,, 30 ,,	0
Second Heat.				
T. O. M. Sopwith	Burgess–Wright Biplane	40 A.B.C.	6 min. 24 sec.	1
C. P. Pizey	Bristol Biplane	50 h.p. Gnome	2 ,, 3 ,,	2
C. Gordon Bell	Bristol Monoplane	50 h.p. Gnome	2 ,, 36 ,,	3
T. O. M. Sopwith	Blériot Monoplane	70 h.p. Gnome	1 ,, 32 ,,	0
A. V. Roe	Avro Monoplane	35 h.p. Viale	3 ,, 0 ,,	0
D. L. Santoni	Deperdussin Monoplane	35 h.p Anzani	3 ,, 24 ,,	0
N. S. Percival	Percival Biplane	60 h.p. Dorman	6 ,, 30 ,,	0

Final:
1st. Raynham: 2nd. Pizey: 3rd. Macdonald

Early Days at Brooklands

Some idea of the flying at Brooklands may be recalled by the fact that in the season of 1911 seven meetings were held altogether, and the prize money amounted to £803 10*s*. 5*d*. This included awards for the aviators who flew for over fifteen minutes between specified hours, a percentage of the gate receipts for the participants, and prizes for the three best aggregate flights during the season, of £150, £100, £50 respectively. Mr. H. Pixton had the best aggregate to his credit, his total time in the air being 7 hours, 33 minutes, 43 seconds. This secured for him the first prize of £150, and other awards, amounting altogether to £419 7*s*. 11*d*. The second prize for the second best total, viz, £100 went to Mr. F. P. Raynham; and the third was gained by M. Louis Noel.

On Whit Monday, 1912, an aeroplane handicap, flown in two heats and a final, varied the motor racing programme. The entrants were:

T. O. M. Sopwith	Blériot Monoplane and Burgess-Wright Biplane
R. L. Charteris	Hanriot Monoplane
C. Gordon Bell	Bristol Monoplane
E. Hotchkiss	Bristol Monoplane
C. L. Pashley	Humber Monoplane
A. V. Roe	Avro Monoplane
M. Ducrocq	Hanriot Monoplane
Captain H. F. Wood	Vickers Monoplane
W. B. Rhodes Moorhouse	Blériot Monoplane

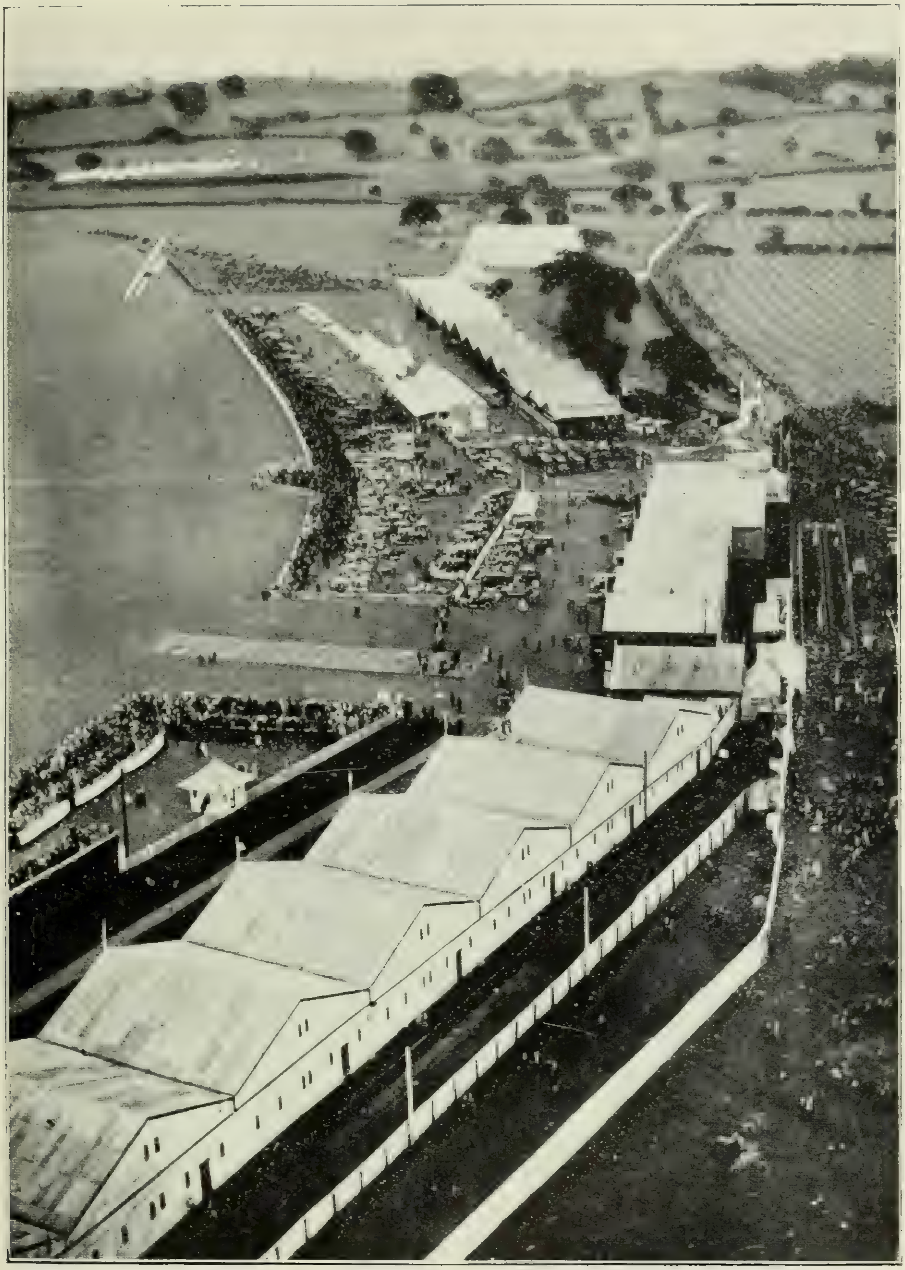
Shortly before the War we had a German aeroplane " invasion " at Brooklands, the D.W.F. inherently stable machine being established there; but this will be described in the chapters " My Note-book ".

CHAPTER IV

EARLY DAYS AT HENDON

THE "atmosphere" of each of the principal flying centres was definitely different from that of either of the others. There were similarities inasmuch as each was concerned with aviation; and to some extent there was an interchange of personnel, many of the airmen appearing at all of them at different times, although each centre had its own particular men. Hendon was different from the others, because almost from the first it became definitely associated with the development of flying sport; and this had its important uses. Hendon aerodrome dates from early in 1911, and it soon became famous as the home of many Flying Schools. With it the names of Mr. Claude Grahame-White, the late Richard Gates, and of Mr. Bernard Isaac are inseparably associated. Hendon ran an independent course, and was often impatient of Aero Club control. There were disputes and controversies, but Hendon went on its way successfully. The climax of its success was the series of week-end flying meetings which began on February 22, 1913, and went on continuously until the end of the year. On no single occasion during that period were the gates of the aerodrome closed to the public, and thousands of flights were made in all conditions of weather, and even at night. At midnight on December 31, 1913, two aeroplanes flew the old year out and the new year in.

Flying meetings were, however, held before 1913, and after, but the year 1913 is memorable for the fact that during it fifty-one race meetings were held, two aerial fêtes and battles of flowers, eleven demonstrations of looping and stunt flying, and five illuminated night-flying exhibitions. Looking back, one may well ask what progress has been made now that the Royal Aero Club is trying to revive the sport of flying as a popular spectacle? The answer is, the War. Had it not been for that calamity Hendon would have gone on to triumphs it is impossible to realise. It is even probable that the progress of civil flying would have been more rapid than it has been. As to technical progress, however, this is evident from the fact that, power for power, the machines of to-day are more than



Hendon Aerodrome. A Race Meeting before the War

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three times as capable as those of the old Hendon days, and are immeasurably superior in construction and reliability. "Civil" flying nowadays is overshadowed by Service flying, whilst the aeroplanes have become so familiar they receive little attention. Before the war Hendon and Brooklands held the stage.

To hark back again: in 1912 there were thirty meetings at Hendon; more than 100 speed handicaps, cross-country races, and altitude contests were held; and thousands of pounds in cash prizes, and many trophies were flown for and won. But the proprietors were also called upon to organise flying demonstrations in many parts of the world.

Now Hendon belongs to the Government, and is a station of the Royal Air Force, although to the general public it is known chiefly as the scene of the annual R.A.F. Display which each year draws a crowd of about 100,000.

In 1910 one went to Hendon and got a flight as a passenger on machines which to-day would be refused a certificate. They were unstable, uncontrollable, and structurally unsound; but the risk was not realised. There were many machines which the crack flyers of to-day would simply refuse to go up in, and if they went up would find extremely difficult to manage. A typical sentence from reports of those days runs: "At times the aeroplane was estimated to be flying at a height of 25 feet"!

In the early days Hendon aerodrome had no restaurant, and one had to go outside to a small café adjoining. The mechanics and many of the pilots and pupils obtained lodging in the neighbourhood. When the weekly race meetings began provision was made for refreshments, and after the War the London Country Club was formed, but that club apparently had no skyward ambitions.

Waiting for the heat eddies to die down, or for adjustments to machine or engine, pilots, pupils, and others sat in a ring on the grass and discussed the perennial subject. Mr. Grahame-White, cigarette in mouth, would stroll along; but this was after he had "arrived". There were Mr. Horatio Barber, Mr. Ridley Prentice, Mr. Lewis W. F. Turner, and a host of others.

Hendon history at first, however, is the story of Mr. Claude Grahame-White, who became the idol of the public at the time of the London-Manchester flight. I give a brief account of his flying career in a later chapter.

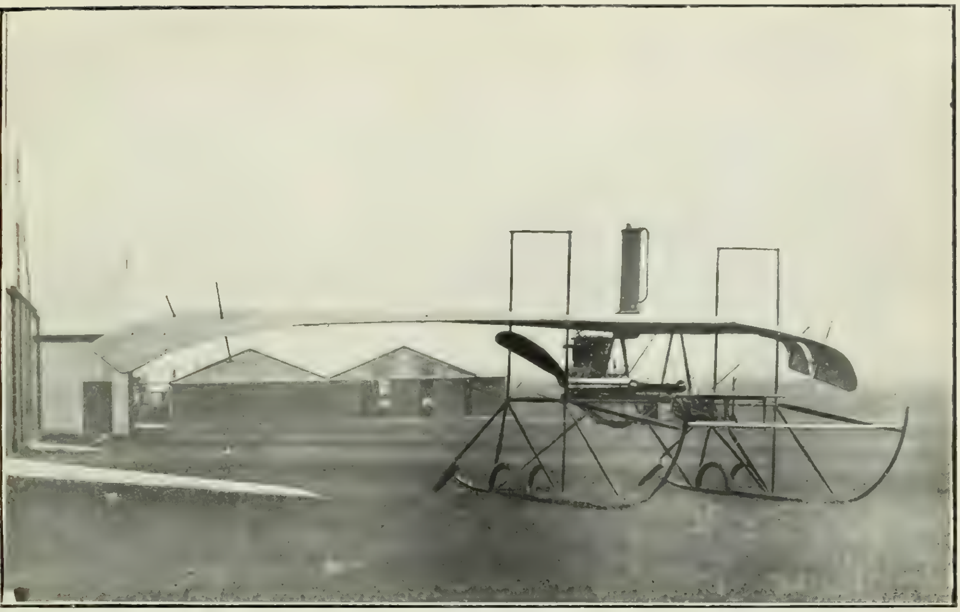
The late Richard Gates made Hendon Aerodrome. It was from here that M. Louis Paulhan started on his flight to Manchester in 1910, and Gates afterwards set to work to clear the ground of trees, and to drain it. Then he decided he must learn to fly, and, being a married man with a family, he did this in a quiet, sober way, taking no risks. But he soon went on to long cross-country flying, on one occasion flying a Farman 80 h.p. Gnome from Paris to Boulogne with M. Louis Noel as passenger. Also he did a good deal of exhibition flying at Hendon, and was the father of "crazy flying" which has become so popular at the R.A.F. Pageants. In the early days it was called "Rag Time Flying". Gates had a reputation for straightness; his word was his bond. And in my opinion the success of Hendon as a centre of flying sport was largely due to him. He had a marvellous faculty for organising, and for sensing the public taste. He did everything quietly and without bluster, and usually with a smile and a joke. Mr. Grahame-White knew how to get the right men, and made him a director of his company and general manager of the aerodrome.

Gates's career had been a varied one. He was in the Imperial Yeomanry, and on Sir Arthur Paget's staff in South Africa, 1900-1902, and had five clasps to his medals. He was killed in a night-flying accident at Hendon a few weeks after the outbreak of the war with Germany.

Mention of Gates reminds me of Mr. Bernard Isaac, one of the earliest men in aviation in this country. He founded the Aeroplane Supply Company, in 1907, and the catalogue of that concern is one of the most interesting documents in connection with the development of flying. For a time he was London Manager of Hendon aerodrome, and after a period of severance he again took over the aerodrome, and helped Mr. Grahame-White to establish a factory. Mr. Isaac has proved by those, and subsequent, activities and successes that he has a gift for organising.

Among the earliest personalities at Hendon were Mr. Robert and Mr. Harold Blackburn who ran a flying school there under the management of Harold who, curiously enough, was not a relation of Robert, the founder of the Blackburn Aeroplane Company.

Another of the pioneers was Mr. Horatio Barber, who settled at Hendon in 1910 and flew his wonderful craft, "the Valkyrie", which had a peculiar control system, and was most difficult to manage. Its stability was none too good, and, in fact, it needed good piloting. The inventor was experimenting on new lines, and is not to be criticised on that particular result. At that time, and for long afterwards, he was an acknowledged authority on aeroplane theory and design. At Hendon Mr. Barber formed the Aeronautical Syndicate, and gathered together a happy band of budding pilots, male and female—Mr. Ridley Prentice, Miss Meeze, the late Captain J. B. Fulton, Captain A. G. Board, Lieut. E. H. Dimmock, Mrs. Palmer, Mr. C.



Mr. H. Barber's "Valkyrie," 1910

F. M. Chambers, and Mr. J. Valentine. There was a three-seater "Valkyrie" with a 50 h.p. Gnome, and Mr. Barber gave a demonstration with hands-off; it could not have been hopelessly unstable! Structurally, Mr. Barber's machines were far above the average.

The programmes of the Hendon meetings deserve particular mention. The bound series is an interesting book of reference, for it contains many articles by Messrs. Claude Grahame-White, J. H. Ledeboer, Richard Gates, Gustav Hamel, B. C. Hucks, C. G. Grey, Harry Harper, Major W. E. de B. Whittaker, Mr. A. G. Reynolds, Mr. J. D. North, and myself. The machines in these days were much slower, and this made it easier to have short races round the pylons. But one of the great draws, the value of which was from the first appreciated by Gates and the others, was the continuity of the meetings. The same pilots appeared week after week, and became as well known to the public as popular jockeys. I am sure present-day air meetings lose by their infrequency; but, also, I am sure, without disrespect to the Royal Aero Club, they lose, also, by the lack of what may be called professional organisation. It must be remembered that the Hendon meetings were virtually outside the Royal Aero Club organisation. But there are more vital comparisons to make than that. Take the question of handicapping.

The organisers of post-War air races at one time failed to realise the influence of wind on craft moving freely about in the air. I write this advisedly, for at the time, over and over again I urged this matter on their consideration, and from conversations I had with officials, and from letters received, it is clear that many of those responsible simply did not know. To explain, vehicles totally immersed in the air, and whose progress is therefore affected by the full extent of any movement of the air, have to be handicapped accordingly. Having ascertained the air-speed of the competing machines it is easy to accord handicaps on the assumption of calm weather. The handicaps, however, must be very different if there be any wind, and the amount of the handicaps must be greater for a strong than for a light wind.

In a flat calm over an out-and-home course of 100 miles each way a machine of

	Hrs.	Mins.
50 m.p.h. would take outward	2	0
50 m.p.h. would take homeward	2	0
Total	4	0

A machine of	Hrs.	Mins.
100 m.p.h. would take outward	1	0
100 m.p.h. would take homeward	1	0
Total	2	0

The former should receive an allowance of two hours. For the same machine over the same course, but during a wind of 25 m.p.h. flowing parallel to the course with the machine on the outward journey, and against it on the way home, the times would be

Machine miles per hour	Hrs.	Mins.
50 would take outward	1	20
50 would take homeward	4	0
Total	5	20
100 would take outward	0	48
100 would take homeward	1	20
Total	2	8
Slow Machine	5	20
Fast Machine	2	8
Allowance should be	3	12

Handicappers need not be discouraged if " form " should upset their calculations. This occurs in all racing. The only thing to do is to be sure of the data, and then to handicap as fairly as possible. In the case of air racing there is very little trouble in leaving the handicapping until the last hour. Tables can be prepared beforehand on the assumption (1) flat calm, (2) wind of 10 m.p.h., (3) wind of 20 m.p.h., (4) wind of 30 m.p.h., and so on, and at the last minute the table adopted which is nearest to the wind then blowing.

Handicappers spend a great deal of time in discovering the exact speed of machines, in order that close finishes may be secured, and it is probable, therefore, that competitors are not always perfectly frank about these things. What one sees over and over again is all this clever calculation upset by a change in the strength of the wind. It ought not to be the object of handicappers merely to ensure close finishes: their job is to accord time allowances in respect of definite features, possibly on the basis of a formula, as indeed is sometimes done. If, irrespective of that, merit appears in design or jockeying, it deserves to win. It is amusing to see handicappers poring over a detail which will make a fifth of a second's difference at the very moment that the wind is either freshening or falling to an extent that will make a difference of three or four minutes.

Of course the most satisfactory way out of the difficulty is to run class races and thus avoid the necessity for handicapping.

But all that is a diversion, although an important one. Of a "military" demonstration at Hendon in May, 1911, I wrote in the *Field:*

"On the whole the conditions were about as unlike anything that would obtain on active service as can possibly be imagined. Of the good things done, the dispatch-carrying to and from Aldershot was one. Another was the dropping of a 100-lb. weight, but this only as a demonstration of the fact that it can be done without upsetting the equilibrium of the aeroplane. Theorising is all very well in these matters, but I confess that I was anxious when I saw Mr. Grahame-White prepare to release the weight. This appeared to be attached slightly forward of the centre of gravity, and it was to be expected that the machine would find her head plunging upwards at its release.

"Apart from the merits of the demonstration as a demonstration it is to be deplored that it should be considered the office of any private body to prove to the authorities by means of such an affair as the Hendon show what are the possibilities of the flying machine of to-day. If we admit the necessity, we must acknowledge that the Parliamentary Aerial Defence Committee are doing good work. But, is it really necessary for our legislators to be coaxed together for an elementary lesson of the kind given them at Hendon? The flying that took place gave, in reality, a very poor idea of what can be done on aeroplanes of the latest types. The machines were not equipped with appliances and instruments that are commonly used by French Army aviators."

I find the following notes on one of the week-end meetings in April, 1912:

"All yesterday at Hendon the wind blew with the force almost of a gale. But if the flying was small in quantity, it was, at any rate, of uncommonly high quality, and seldom have any finer exhibitions been seen than those given during the afternoon by Mr. Gustav Hamel, Mr. Grahame-White, and Mr. Lewis Turner. Other pilots, including Mrs. de Beauvoir Stocks, came out with their machines, but were very properly dissuaded from attempting ascents. As on the first day of the meeting, the aerodrome was crowded, there being some 16,000 present, and a record number of motor-cars.

"After the parade of machines at 2.30 Mr. Grahame-White came out on his Farman biplane, and showed by the way his aeroplane rolled and lurched that the airways were very rough. The anemometer recorded a pulsating wind of 10-35 m.p.h., but the instrument stands in a sheltered position and discounts the strength of the wind by ten or fifteen per cent.

" As on Friday, Mr. Hamel gave the great exhibitions of the day. His management of his Blériot monoplane was superb, and he held the spectators spellbound by his sharp turning, steeply banked. This was far more impressive than any amount of ordinary, aerodrome flying as a revelation of the power of man and machine over the unstable air. He ascended at 4.30 in a nasty wind and rose rapidly. The higher he went the worse became the wind, and at 2,600 feet his machine was rocking in an alarming manner. But with consummate skill he kept a level keel.

" Mr. W. H. Ewen made a short flight in his Deperdussin monoplane, and as the afternoon wore on Mr. Hamel and Mr. Grahame-White gave a number of clever exhibition flights, the latter finishing with a display on his 70 h.p. Nieuport.

" It is to be recorded with satisfaction that in spite of the extremely difficult conditions during two days of the meeting not the slightest mishap or breakage has occurred."

Here is the Easter Monday programme, 1912:

12 to 1.30	Parade of aeroplanes.
1.30 to 2.30	Biplane handicap speed contest. Eight laps (twelve miles). Open to all types of biplane. Prizes, 20 sovereigns and 10 sovereigns.
2.30 to 3.30	Speed contest. Third day (final ten laps).
3.30 to 4.30	Cross-country handicap. Hendon to St. Albans and back, about 22 miles. Open to all types of aeroplane. Prizes, 50 sovereigns and 20 sovereigns.
4.30 to 5.50	Relay race. Four laps (six miles). Competitors will start in pairs, monoplane and biplane. The monoplane of each pair is to fly the first two of the four laps from a standing start. On landing as near as possible to the starting point the pilot will run to the judge's enclosure and obtain a despatch. He will then run to his team mate's two-seater biplane, and get on board as passenger. The pair will then fly the remaining two laps, finishing as near as possible to the judge's box; both will dismount and run to the judge with the despatch. Time will decide the contest. Prizes, 20 sovereigns and 10 sovereigns.
5.30 to 6.15	Altitude passenger-carrying. Open to all types. Prize, 25 sovereigns.

This year (1927) a feature of the Easter meeting at Bournemouth was its " Oaks " for lady pilots. Many newspapers hailed this as the first ladies' air-race in England. However, in the interests of accuracy it is necessary to record the fact that on Saturday, June 29, 1912, a ladies' race was held at Hendon. Also a trophy was given to the first lady who carried a lady passenger twice round the course. There were not many lady aviators in England, or in any other country: only the following, I believe.

Mrs. Hewlett, the first English woman to take out an aviation certificate (November, 1911, No. 122 in the Royal Aero Club list) was the only mother in the world who taught her own son to fly.

Mrs. de Beauvoir Stocks was frequently seen aloft by the crowds at Hendon, where she piloted a Farman biplane; she was the second English woman to become an aviator, and she took her certificate on November 11, 1911, and is 153 on the list of pilots.

At Hendon two ladies were learning to fly. One was Miss Dorothy Prentice, a keen student of aeronautics, who seldom missed an Aeronautical Society lecture; and Baroness Schenk, a young German lady, who was learning the Howard-Wright biplane.

Mrs. W. Buller took her certificate in France.

The best-known French lady flyer was Mademoiselle Dutrieu who in 1910 and in 1911 won the Femina Cup. Mlle. Dutrieu was formerly known as "the human arrow" on account of her performance of a sensational feat on a bicycle, until the police forbade it. Her great aviation rival was Madame Herveu, who flew a Blériot monoplane.

The first woman in the world to obtain a pilot's certificate was Baroness de la Roche, who won her "brevet" as long ago as Christmas, 1909, and who flew round the Pyramids, at Tours, Budapesth, Rheims, and many other places. Baroness de la Roche had two or three accidents. Mlle. Marvingt, a French lady, flew a Deperdussin monoplane. Two French lady aviators had at that date been killed, Mlle. Bernard, while flying for her certificate at Etampes, and Madame Denise Moore, while learning. Miss Julia Clark was killed in America.

To an American belonged the credit of the first aeroplane flight by a woman across the Channel. Miss H. Quimby, the first American woman aviator, performed this feat on May 16, 1912.

There were only two competitors in the ladies' air race at Hendon on June 29, 1912, and Mrs. Stocks won. Many races were held at this period in which lady passengers received prizes according to their pilot's performance.

On Whit-Sunday, 1912, M. Brindejonc des Moulinais, the famous young French pilot, then the holder of the long-distance record, flew over from Bremen, by way of Brussels and Calais, to Hendon, for the express purpose of taking part in the race for the Giesler Challenge Trophy which was to be flown for in the afternoon of Whit-Monday. During the course of his flight from Calais he not only unwittingly infringed Home Office Regulations, issued under the Aerial Navigation Act, by failing to land in one of the prescribed areas and reporting himself to the local authority, but also failed to comply with the rule made by the Royal Aero Club deprecating unnecessary flights over towns, and over London in particular. For the former offence he subsequently appeared at Bow Street, where, on expressing his regret at having infringed the provisions of the Act, of whose very existence he was ignorant, he was simply bound over.

But the attitude of the Royal Aero Club was a different one, and on Monday morning the officials of the meeting were informed by letter that M. des Moulinais' license had been suspended by the club, and that in consequence he was ineligible to compete in the races. As a matter of fact, he actually did compete, won the race, and was handed both the challenge trophy and the hundred sovereigns that accompanied it. His victory, it may be added, proved a most popular one. Mr. W. L. Brock came in second.

Mr. Brock, the American aviator, and one of the regular Hendon pilots, disclaimed any desire to contest the possession of the prize, but a lengthy correspondence passed between the Royal Aero Club and the Grahame-White Company, which culminated in the instruction issued by the Committee of the Club to Messrs. Grahame-White to pay out the prize-money to the pilot who obtained second place in the race (Brock). This the company refused to do. Mr. Grahame-White and Mr. Richard Gates then resigned their membership of the Royal Aero Club.

Now the facts of the case as given by M. des Moulinais himself were as follows:

Flying from Calais he soon lost sight of the ground, which was enveloped in a thick haze; accordingly, unaware of the Aero Club's regulation prohibiting aeroplanes from flying over London, he steered a direct compass course for Hendon, maintaining an average height of about 3,000 feet. It was not until he was over the centre of London that he discovered his whereabouts, as the haze lifted, and then resolved to continue his journey, which he safely accomplished. That same evening, on being informed of the regulation, he wrote a letter of apology to the Club.

The Club's regulation was soon afterwards replaced by a more stringent order from the Home Office absolutely forbidding flights over an area of four miles from Charing Cross, but under the Act any pilot infringing the order would be given the opportunity of proving his infringement to have been due to stress of weather.

The late Lieut.-Col. J. L. Travers (who was killed in a flying accident at Croydon in 1925) was much at Hendon. In 1905 he took the first step in his career as an engineer at the works of Legros and Knowles, Willesden. And from that firm he elected, in 1909, to move to the Balloon Factory, South Farnborough, where he was employed as a draughtsman. Colonel Travers, however, very soon discovered that at that period the open-air laboratory was as important as the drawing office; and that brilliant scientific man, the late Professor Huntington, who was then conducting his important experiments at Eastchurch, secured his services as an assistant. At Eastchurch Lieut.-Col. Travers (then, of course, a civilian) did a lot of private experimental work on aeroplanes and engines. He did his certificate tests on a Farman biplane at Hendon on May 16, 1911. He was No. 86 on the British list.

Always well to the front in the development of the aeroplane, he became chief draughtsman to Short Brothers, and there specialised in the construction and testing of marine aircraft, for which Shorts have ever been famous. Soon, however, he was piling up flying experience as pilot and instructor for the Grahame-White Aviation Company. Between 1911 and 1913 he was one of the " regulars " of Hendon, Shoreham, and Brooklands. He was always flying and always developing, and he was that invaluable combination of engineer and pilot to which aviation then, as now, offered a great opportunity. He flew in many competitions at Hendon.

When the Senior Service began to unbend towards flying, and the Naval Wing of the R.F.C. was formed, J. L. Travers was the first direct entry from civil life to it. This was in 1913, after which he was occupied with experimental work and testing of naval aircraft.

One of the big figures at Hendon was the late Bentfield Charles Hucks who, after a wonderful career, died from pneumonia following influenza. He joined Mr. Grahame-White in 1910, and toured with him in England and America. He taught himself to fly on a Blackburn monoplane at Filey. Hucks was the first British aviator to "loop", and was for a long time, without a doubt, the finest aviator in this country. He was one of the airmen who have been favoured with a Command to fly before the King.

During his passing-out flights for a certificate his machine broke in the air! He had his share of accidents. Thus, in the

Circuit of Britain his engine failed at Luton, and he landed in a field enclosed by a barbed-wire fence which carried his chassis clean away.

In June, 1912, an Australian gentleman who gave prizes in the Aerial Derby paid £1,000 to the Grahame-White Company to release Hucks from his six months' contract. In July of that year Hucks flew from Hendon to Birmingham, 110 miles, in about 1½ hours, on a Blériot monoplane. Over Rugby he was caught in a rain squall, and was hurled about like a leaf. His course was almost sideways, so big was the angle of his machine to its path on account of allowance for drift.

He used his aeroplane in a flying campaign for the Unionist candidate at an election in Midlothian in August, 1913, and in the same month lost a race with Hamel in a flight from Birmingham to Redditch, Coventry, Nuneaton, Tamworth, Walsall, and back to Birmingham; but only 20 seconds separated them at the finish.

In 1912 Hucks flew from Weymouth to Hendon, non-stop, 133 miles, in 105 minutes. Also from Hendon to Bath and back, without a stop either way, 212 miles, in 200 minutes flying time. On one occasion he carried sample tins of tobacco to towns round Newcastle.

In 1913, he flew upside-down and looped-the-loop at Buc, the first Englishman to do it, and on return to England he was met at Charing Cross by other aviators and " chaired " upside down! This was followed by exhibitions at Hendon of upside-down flying and looping-the-loop.

At the outbreak of War Hucks joined the R.F.C. and went to France, where he contracted pleurisy. He was invalided home and given Captain's rank, and became test pilot for Mr. Holt Thomas's Company.

Hucks left his mark on aviation in a great many ways. Material evidence of it is afforded by the Hucks Starter, that queer-looking auto-carriage with an apparatus from which a long arm stretches out. Its long arm is attached to the propeller of an aeroplane, which is thus started without swinging by hand. How many lives and how much labour has the Hucks starter saved?

Here is a 1913 list of Hendon aviators and their machines:

G. W. Beatty	Wright	Biplane	50 h.p. Gyro
Pierre Verrier	Maurice-Farman	Biplane	70 h.p. Renault
Robert Slack	Morane-Saulnier	Monoplane	50 h.p. Le Rhône
Gustav Hamel	Blériot	Monoplane	50 h.p. Gnome
N. Spratt	Deperdussin	Monoplane	60 h.p. Anzani
Lieut. J. C. Porte	Deperdussin	Monoplane	110 h.p. Anzani

W. L. Brock	Deperdussin	Monoplane	35 h.p. Anzani
Sydney Pickles	Caudron	Biplane	60 h.p. Anzani
L. W. F. Turner	Caudron	Biplane	60 h.p. Anzani
Louis Noel	Maurice Farman	Biplane	70 h.p. Renault
M. D. Manton	Grahame-White	Biplane	50 h.p. Gnome
R. H. Carr	Grahame-White	Biplane	50 h.p. Gnome
P. Marty	Morane-Saulnier	Monoplane	50 h.p. Le Rhône
M. Debussy	Bréguet	Biplane	110 h.p. Canton-Unné
R. W. Gill	Deperdussin	Monoplane	50 h.p. Gnome
E. Baumann	Caudron	Biplane	35 h.p. Anzani
R. T. Gates	Grahame-White	Biplane	50 h.p. Gnome
G. L. Temple	Caudron	Biplane	35 h.p. Anzani
E. Whitehouse	Handley Page	Monoplane	50 h.p. Gnome
W. Birchenough and C. Grahame-White	Grahame-White Morane-Saulnier Nieuport	Biplane Monoplane Monoplane	50 h.p. Gnome 50 h.p. Le Rhône 50 h.p. Gnome

That list of aviators reminds me of many Hendon personalities, and if justice were done to them a big volume could be filled with interesting matter. The late Gustav Hamel is always associated in my mind with B. C. Hucks, for they were rivals in skill and enterprise. Hamel was the son of one of the late King Edward's doctors. After leaving Westminster School he put his energies into aviation, and quickly came into prominence. He had a most charming personality, and was a universal favourite; but, although I yield to none in my admiration of him, in justice I concede that Hucks was, if anything, the slightly better all-round pilot. In 1914 both aviators had long engagement lists which were never completed, first because Hamel's death deprived the world of one of its most brilliant pilots, secondly because of the War. I have dealt with Hamel's achievements in various parts of the book. I had several flights with him at Hendon, and was associated with him in the writing of a book *Flying: Some Practical Experiences*, which came out in the spring of 1914. It was the first attempt to deal with flying on a practical basis and on a broad plan, and it was received by the public and the press with very great favour. Hamel's modesty and brilliance had won him universal popularity. I treasure some of his personal notes which went to the making of that book.

One of the most capable and popular men at Hendon was Mr. Lewis W. F. Turner. For long he was one of the regular competitors in the weekly flying meetings, and every day he could be seen giving instruction to numerous pupils. Although not a " star " flyer, he was one of the most experienced and seasoned of aviators, with a thorough knowledge of the mechanics of motor and machine. Since early in 1911 he had pursued his calling and, being an instructor, that calling was of necessity one of drudgery. Few people outside the aviation world have any conception of the rigours of a flight teacher's occupation. The amount of actual flying they do is almost incredible, and much of this flying is of the tamest character, whilst, as it involves taking pupils up and letting them have a hand on the controls, it is not without risk.

Mr. Lewis Turner had the distinction of being the first Englishman to take his certificate under the more stringent regulations and tests imposed by the International Aeronautical Federation in the spring of 1911, and soon afterwards he went out to Russia as chief pilot of the Kennedy Aviation School, St. Petersburg. His winter's flying in Russia gave him valuable and interesting experience. On returning to England he was appointed chief instructor at the " Valkyrie " School, and then at the Grahame-White School, which he later left for Mr. Ewen's School. He had flown on numerous types of machines and had had a number of minor accidents and adventures. In competitions in 1911 Mr. Lewis Turner gained eleven firsts, nine seconds, and twelve thirds, and he won every bomb-dropping contest at Hendon. It was suggested that his initials (L.W.F.T.) stood for " Lewis will fly to-day ", as he flew any machine in any weather.

There was a strong international element at Hendon, for there those great pilots Pierre Verrier, Louis Noel, P. Marty, W. L. Brock, G. W. Beatty, and others, were wont to display their talent. Verrier's flying on a Maurice Farman " pusher " was something to remember. He did all the stunts except looping-the-loop and upward spirals, and on such a machine those would have been impossible. The machines at Hendon, in the light of the types developed during and since the War, were very slow, and many can remember the sensation caused when Lieut. Porte flew a Deperdussin at 90 miles per hour. Most of the exhibition and racing flights were at speeds not exceeding 60 m.p.h., and that speed would be regarded as slow even by the pilots of light aeroplanes with " bicycle " engines to-day.

On one occasion Verrier flew against a gale from Hendon to Brooklands, and took 2 hours, 10 minutes to do the 22 miles; and I remember a hovering display when from a height of 1,000 feet, facing the wind, he flopped down slowly and vertically, his machine on the verge of stalling; and stalling was a more dangerous business in the old pushers even than in tractors and modern types generally. Verrier was a great prize-winner, both in England and in France, and was victorious in the Pommery Cup contest in 1914.

Early Days at Hendon

Marty, a Caudron flyer, had an amusing adventure early in 1913. Sent to deliver a Caudron biplane to the Ewen Company at Hendon he flew over prohibited area at Dover, and on landing near Canterbury he was arrested. He made a height record with three passengers, ascending to 6,000 feet, thus beating M. Chevillard who, by the way, was another Hendon performer. Marty was killed in a flying accident at Hendon in April, 1914.

Frank W. Goodden was a popular racer at Hendon, and, by the way, he had been associated with the late Ernest T. Willows in the building of that aeronaut's first airship, the " City of Cardiff ", and he accompanied Willows on his flight to Paris. He built a monoplane at Oxford in 1912, but became a Caudron pilot and was, I believe, the first to loop that unlikely-looking bus. He made many balloon ascents and parachute descents.

The two brothers Slack learned to fly in connection with the International Correspondence Schools, which ran an aviation " course ". Robert made a tour of 1,200 miles on a Blériot, and many other shorter tours, and he flew from Villacoublay to Hendon with French newspapers for President Poincaré, the flight being carried out in a fierce gale of wind and rain. He was killed in a motor-car accident. His brother was a pilot of the Wright machine.

Norman Spratt, who, by contrast with his name, was a big, burly man, was a South African. He was a Deperdussin flyer, and had charge of the " Dep." School at Hendon at one period. An engineer of considerable attainments, he had an appointment at Ladysmith. He flew for the French firm of Bréguet for some time, but was back at Hendon in 1914.

Pierre Prier, another Hendon man, took a degree of *Bachelier des Lettres*. Then he studied mechanics and electricity at the Electrical School in Paris, where he obtained distinction of *Ingenieur Electricien*. He did military service in the Frontier Battalion, after which he joined the firm of Blériot for construction and trials of aeroplanes. In 1910 he was sent by the Blériot firm to take charge of a flying school in England (Hendon). He was the first to make a non-stop flight from London to Paris, on the twelfth of April, 1911.

Mr. George Beatty, an American engineer, brought a Wright biplane to England in 1912 to demonstrate the Gyro rotary motor; and he astonished the British public by his wonderful trick-flying. His Wright machine was an approach to standard methods as regards controls. He founded the Beatty School of flying at Hendon.

André Marcel Desoutter was for long one of the best of the Blériot flyers at Hendon, and in 1912 joined the Grahame-White Company. He had a crash on a Blériot, and one of his legs had to be amputated. Thereupon he set to work to invent an artificial leg, which became a very great success, and was, and is, widely known. Desoutter has flown, and driven cars, and swum since that accident.

Sidney Pickles, who drove a car in Australia at the age of twelve, which was unusual at the dawn of the present century, came to England in 1912, and learned to fly at the Bristol Schools, on Salisbury Plain and at Brooklands. He did a great deal of flying and took the " advanced brevet ". He had a bad accident at Hendon while carrying Mrs. Stocks as passenger after a race meeting; and, by the way, the machine fell quite close to my wife and son who were then leaving the aerodrome. Fortunately, the crowd had almost entirely left, otherwise the accident might have been much more serious. Pickles sustained injuries to the spine and leg. He, nevertheless, entered the R.N.A.S. and saw service in France, and later did test flying on Government machines.

Mr. Ridley Prentice was one of the early pilots at Hendon, and he had the astonishing record of flying during a period of eight months on the " Valkyrie ", evidence enough that he was both skilful and plucky. For many years he was engaged in a branch of the aviation industry.

As a matter of historical interest, I give here a list of the prizes and trophies presented for competition at the London Aerodrome during 1912–13. There has been far less encouragement since the war.

Season 1912.

Date.			Won by.
April	5	Grahame-White Cup, No. 1	Gustav Hamel
,,	20	Grahame-White Cup, No. 2	Gustav Hamel
,,	20	Grahame-White Cup, No. 3	B. C. Hucks
,,	27	Arthur Roberts, Esq.	Gustav Hamel
,,	27	Herbert Sleath, Esq.	James Valentine
May	18	Seymour Hicks, Esq.	Lewis Turner
,,	18	P. Teofani, Esq.	Lewis Turner
,,	25	Barlow Trophy	James Valentine
,,	27	Giesler Trophy	James Valentine
,,	27	Harry Randall, Esq.	W. H. Ewen
,,	27	Cyril Maude, Esq.	James Valentine
,,	27	Miss Marie Tempest	S. F. Cody
June	1	Miss Julia Neilson and Fred Terry, Esq.	Gustav Hamel
,,	1	P. Martinetti, Esq.	Pierre Verrier
,,	1	St. Ivel Trophy	Gustav Hamel
,,	8	*Daily Mail* Trophy (Aerial Derby)	T. O. M. Sopwith

June	8	"Shell" Trophy	F. P. Raynham
,,	8	London Aerodrome Gold Trophy	Gustav Hamel
,,	8	London Aerodrome Silver Trophy, No. 3	Mons. Guillaux
,,	8	London Aerodrome Silver Trophy, No. 4	W. B. R. Moorhouse
,,	8	London Aerodrome Silver Trophy, No. 5	James Valentine
,,	8	London Aerodrome Silver Trophy, No. 6	Pierre Verrier
,,	8	London Aerodrome Silver Trophy, No. 7	S. V. Sippe
,,	22	Grahame-White Cup, No. 4	B. C. Hucks
,,	27	Arthur Bourchier, Esq.	B. C. Hucks
,,	27	W. Clarkson, Esq.	B. C. Hucks
July	6	Lady Shelley	Miss Trehawke Davies (passenger)
,,	6	*Daily Mirror*	Mrs. Stocks
,,	6	London Aerodrome Trophy, No. 1	Mrs. Stocks (passenger)
,,	6	London Aerodrome Trophy, No. 2	Mrs. Gates (passenger)
,,	6	Messrs. Mappin & Webb	Lewis Turner
,,	6	Women's Aerial League	Pierre Verrier
,,	6	Aerial League (purse)	Lewis Turner
,,	6	Mrs. E. Goddard (purse)	Pierre Verrier
,,	6	Lady Manns (purse)	Pierre Verrier
,,	6	Lady O'Hagan	Lewis Turner
,,	13	Miss Florence Parbury	H. J. D. Astley
,,	13	Grahame-White Cup, No. 5	G. Sabelli
,,	20	Rushmore Lamps, Ltd.	Jules Nardini
,,	20	Maurice Farkoa, Esq.	H. J. D. Astley
,,	25	London Aerodrome Trophy, No. 8	Scouts' Model Competition
,,	25	Hendon Trophy, No. 1	Scouts' Model Competition
Aug.	28	*Tit-Bits* Trophy	Jules Nardini
,,	31	Mosley Flowers & Co.	Lewis Turner
,,	31	G. H. Chirgwin, Esq.	M. Desoutter
,,	31	London Aerodrome Trophy, No. 9	Lewis Turner
,,	31	R. A. Yerburgh, Esq., M.P.	Louis Noel
Sept.	7	London Aerodrome Trophy, No. 10	G. Sabelli
,,	7	Grahame-White Cup, No. 6	Louis Noel
,,	14	Horace Goldin, Esq.	Sydney Pickles
,,	14	Hendon Trophy, No. 2	R. T. Gates
Oct.	5	J. E. Withers, Esq.	Lewis Turner
,,	5	International Correspondence Schools, No. 1	Lewis Turner
,,	12	Maharajah of Alwar	Lewis Turner
,,	19	International Correspondence Schools, No. 2	Louis Noel
Nov.	2	London Aerodrome Trophy, No. 12	M. Desoutter
,,	9	Grahame-White Trophy	R. T. Gates
,,	9	London Aerodrome Bronze Trophy	Louis Noel
,,	9	London Aerodrome Trophy, No. 11	Sidney Pickles

The Old Flying Days

SEASON 1913.

Feb.	22	Aero Show Trophy	M. Richet
Mar.	24	Oddenino Trophy	G. Collardeau
,,	24	*Daily Express* Prize	G. Collardeau
,,	24	*Daily Express* Prize	P. Verrier
April	19	London Aerodrome Trophy, No. 13	M. Chevillard
,,	19	Cherry Kearton Prize	M. Chevillard
May	10	Maher Trophy	H. Hawker
,,	10	"Shell" Prize	L. Turner
,,	10	"Shell" Prize	R. Slack
,,	12	London Aerodrome Prize	L. Turner
,,	12	Giesler Trophy	Brindejonc des Moulinais
,,	12	Horace Goldin Prize	L. Turner
,,	13	London Aerodrome Prize	R. Slack
,,	13	London Aerodrome Prize	P. Verrier
,,	24	The Withers Cup	W. L. Brock
,,	24	Agent Gen. Brit. Columbia Prize	W. L. Brock
June	7	London Aerodrome Trophy, No. 14	J. Nardini
,,	14	North London Cup	P. Verrier
,,	14	London Aerodrome Trophy, No. 15	W. L. Brock
,,	14	Miss Trehawke Davies Prize	P. Verrier
,,	14	Miss Trehawke Davies Prize	J. Nardini
,,	21	The Kisch Gold Case	W. L. Brock
July	5	The Elkington Bowl	P. Verrier
,,	5	Mrs. W. Hutton Prize	P. Verrier
,,	5	Women's Aerial League Cup	A. Cheeseman
,,	5	The London Aerodrome Cup	L. Noel
,,	5	Mappin & Webb Bowl	P. Verrier
,,	12	Teofani Cup	P. Verrier
,,	19	London Aerodrome Trophy, No. 16	R. Slack
,,	24	London Aerodrome Trophy, No. 17	Lieut. J. C. Porte
,,	26	London Aerodrome Trophy, No. 18	G. Beatty
Aug.	2	I.C.S. Cup	R. Slack
,,	2	Preston Cup	R. H. Carr
,,	2	C. C. Wakefield Co. Prize	R. Slack
,,	4	Desborough Challenge Bowl	P. Verrier
,,	9	Mappin & Webb Challenge Trophy	L. Noel
,,	9	London Aerodrome Trophy, No. 19	F. P. Raynham
,,	9	London Aerodrome Prize	L. Noel
,,	16	London Aerodrome Prize 99	R. Slack
,,	16	London Aerodrome Trophy, No. 20	P. Marty
,,	16	High Commissioner of New Zealand Prize	R. Slack
,,	23	London Aerodrome Cup	Lieut. J. C. Porte
,,	23	Hendon Cup	R. Slack
,,	28	London Aerodrome Trophy, No. 21	M. de Bussy
,,	28	Anglo-American Oil Co. Prize	M. de Bussy
,,	28	Anglo-American Oil Co. Prize	P. Verrier
,,	30	London Aerodrome Trophy, No. 22	W. Birchenough
Sept.	6	London Aerodrome Prize	P. Marty
,,	13	London Aerodrome Prize	L. Noel
,,	13	London Aerodrome Trophy, No. 23	M. D. Manton
,,	20	*Daily Mail* Aerial Derby Gold Cup	Gustav Hamel
,,	20	"Shell" Cup	B. C. Hucks

Sept.	20	London Aerodrome Trophy, No. 24	H. Hawker
,,	20	London Aerodrome Trophy, No. 25	H. Barnwell
,,	27	Anglo-American Oil Co.'s Trophy	L. Noel
Oct.	4	H. Preston's Prize	E. Baumann
,,	16	*Weekly Dispatch* Cup	P. Verrier
,,	18	London Aerodrome Cup (dead heat)	C. Grahame-White W. L. Brock
,,	25	London Aerodrome Prize	L. Noel
,,	25	Capt. E. C. Bass Prize	L. Noel
,,	25	Capt. E. C. Bass Prize	P. Marty
Nov.	1	London Aerodrome Trophy, No. 26	M. Dyott
,,	8	Sussex Motor Yacht Club Trophy	P. Verrier
,,	8	The Barclay Walker Trophy	Gustav Hamel
,,	15	"Shell" Trophy	W. Birchenough
,,	22	The London Aerodrome Cup	L. Noel
Dec.	13	The Hendon Cup	R. H. Carr
,,	20	The Grahame-White Cup	P. Marty

SPECIAL PRESENTATIONS

April	19	Special Silver Trophy	M. Chevillard
Dec.	26	London Aerodrome Trophy	M. Chanteloup
,,	26	London Aerodrome Gold Medal	Gustav Hamel
Nov.	6	London Aerodrome Gold Medal	B. C. Hucks
,,	6	London Aerodrome Gold Medal	R. H. Carr
,,	5	London Aerodrome Silver Medal	L. Noel
,,	5	London Aerodrome Silver Medal	R. H. Carr
,,	5	London Aerodrome Silver Medal	M. D. Manton
,,	15	London Aerodrome Silver Medal	F. P. Raynham

A sensation was caused in September, 1913, when Louis Noel took up four passengers in the new five-seater Grahame-White aeroplane. The passengers were seated in wickerwork chairs behind the pilot. On the previous day the Lord Mayor of London and his Aldermen visited the aerodrome and saw brilliant flying in wind which at times reached gale strength. It was not uncommon in those days for the gate to reach a total of 25,000 to 30,000.

I have before me the menu of the " Upside-Down-Dinner " at the Royal Automobile Club given in celebration of the upside-down flying and looping by B. C. Hucks and Gustav Hamel, following Adolphe Pegoud's demonstrations. The cards of invitation were printed upside-down, with an aviator shown standing on his head, and the whole of the programme was ingeniously adapted to the occasion. I do not credit the story that the subsequent proceedings were even more realistic.

Although Hendon was the home of the sport rather than of the science of aviation there were times when interesting technical issues were discussed and illuminated. Thus I find the following note written in November, 1913: " Last Saturday the crowd at Hendon had the unprecedented experience of seeing an aeroplane handicap with a biplane conceding time to monoplanes of equal power. The biplane was the Avro, and the monoplanes were a Morane-Saulnier and a Blériot. And this goes to show that unless a monoplane be a racing machine with everything cut down, including wing area, it is not necessarily a faster craft. Those people who at one time roundly proclaimed that the monoplane was the type that would survive because it was faster, and prettier, and more bird-like than the biplane will have to reconsider matters. The respective merits of the two divisions must be considered independently of speed. The biplane may be better for observation purposes. It may be a better weight-carrier, and a better glider. The monoplane may score in being easily demountable."

Thereafter the biplane had a long innings, and throughout the whole range of aeroplane sizes to this day the monoplane without exterior bracing necessitates a weight of structure for strength which counter-balances the advantages of cleaner outline. Even in the light aeroplane this appears to be true, although the monoplane offers advantages for easy wing-folding and for pilot's view. In high-speed races such as that for the Schneider Trophy, the monoplane, however, held its own in 1926, after many biplane years.

Pages could be written about officials and habitués at Hendon. There one would meet the late Lieut.-Col. H. S. Massy, the untiring Air League chairman, a genial soul, and an enthusiast. I remember one curious custom of his. He was a cigarette smoker, but he would point out that nobody ever finishes a cigarette, and that usually after a minute or two they are thrown away. He, accordingly, cut all his cigarettes in two, thus making a double number for the money and evading the irritating sense of waste caused by throwing away unsmoked three-quarters of cigarettes. One of his letters in my possession relates to a lecture on aviation he had arranged. He wrote:

" The lecture was announced during this morning's service in St. Mary's Church and each member of the congregation was handed a notice at the conclusion of the service. I hope to interst many more London and Country vicars in the near future. I had a very successful lecture at Bournemouth on Wednesday with the Mayor in the chair, and am lecturing at Harrow on Wednesday next, and have been asked to lecture at Penzance shortly, so I am kept busy."

Another Hendon figure was Captain C. T. Tyrer, who used to do wonders in the shooting contests. Small balloons were sent up, and an aeroplane with a marksman armed with a shot gun would chase them and try to bring them down. I renewed Captain Tyrer's acquaintance in France, where he was engaged at the "bandstand" where the signals were arranged for sending off night-bombing machines and guiding them home again.

Also, there was Commander (now Lieut.-Col.) H. Delacombe, who used to attend aviation meetings with a long telescope under his arm; this, combined with his own high stature, making him the more conspicuous in any ordinary crowd. Mr. George H. Mansfield, Mr. A. J. Wallace Barr and Mr. A. G. Reynolds, were then engaged on staff work at flying meetings, and are still frequently so occupied.

Hendon became famous as the starting and finishing point of the "Aerial Derby", the annual race round London, inaugurated in 1912 for a trophy offered by the *Daily Mail*. The race (then one of 80 miles) was won in the first year by Mr. T. O. M. Sopwith, almost his last appearance as an aviator. Seven started. Mr. Sopwith was at first disqualified, it being stated he had failed to round one of the turning points, but he appealed successfully. His average speed round the course was 60 m.p.h.

The race in 1913 was full of incident and excitement. The course was now one of 94 miles. Leaving Hendon aerodrome competitors had to fly in a S.S.W. direction via Ealing, Brentford, and Hounslow to Kempton Park; S.E. to Epsom Racecourse; thence E.N.E. via Sutton, Croydon, Bromley, and Bexley, east of Purfleet to West Thurrock; N.N.W. via Hornchurch and to the east of Romford to Epping, where a slightly more westerly route was followed as far as Hertford, where a sharp turn was taken to the S.S.W., past Potters Bar and New Barnet to Hendon.

The Aerial Derby Trophy was for absolute speed, but in addition a sealed handicap was arranged, the competitors being ignorant of the time allowances until after the race.

In this race Gustav Hamel, the last of the eleven competitors to leave Hendon Aerodrome, was, nevertheless, the first to return, having overtaken, somewhere in the 94½ miles course, one after another of his rivals until all had been passed. He only just managed to overtake the last of the ten, Mr. H. Barnwell, the two machines sweeping down to the aerodrome almost "neck and neck" in a grand finish; and Mr. Barnwell had started two minutes before Hamel, whose average speed was 76 miles per hour.

Hamel's performance was the more remarkable for the reason that while crossing the Thames at West Thurrock a petrol tap worked out and fell off, a stream of petrol instantly bursting out. This was so much to the pilot's discomfort, and so serious a loss of fuel, that he was obliged to hold a finger on the vent for the rest of the journey; and there were some forty miles still to fly. This embarrassment caused him to go about four miles out of his way, and it might have compelled a less experienced pilot to land. He was drenched with petrol.

His machine was a Morane-Saulnier, fitted with an 80 h.p. Gnome motor. The area of the lifting surface was only 115 square feet.

The starters were:

	Pilot.	Engine and Machine.
No. 3	E. Baumann	60 h.p. Anzani Caudron Biplane
„ 5	Pierre Verrier	80 h.p. Gnome H. Farman Biplane
„ 6	W. L. Brock	80 h.p. Gnome Blériot Monoplane
„ 7	B. C. Hucks	80 h.p. Gnome Blériot Monoplane
„ 8	F. P. Raynham	80 h.p. Gnome Avro Biplane
„ 9	H. Hawker	80 h.p. Gnome Sopwith Biplane
„ 10	P. Marty	50 h.p. Le Rhône Morane-Saulnier Monoplane
„ 11	R. Slack	80 h.p. Le Rhône Morane-Saulnier Monoplane
„ 12	H. Barnwell	120 h.p. Austro-Daimler Martinsyde Monoplane
„ 13	Lieut. J. C. Porte	110 h.p. Anzani Deperdussin Monoplane
„ 15	Gustav Hamel	80 h.p. Morane-Saulnier Gnome Monoplane

The absolute flying times of the first three were:

Hamel	..	..	75 min. 49 sec.
Barnwell	..	..	78 min. 44 sec.
Hawker	..	..	85 min. 24 sec.

B. C. Hucks won the handicap.

Lieut. Porte and E. Baumann were the only starters who did not complete the course.

In the third Aerial Derby (1914) the winner, both of the absolute speed prize and the handicap first prize, was Mr. W. L. Brock, the American pilot, on a Morane-Saulnier monoplane.

The race was flown under very difficult conditions, thick mist causing all the pilots to go wide, and many of them to lose their way altogether. The contest was marked by several remarkable incidents and adventures. Good piloting and navigation had much to do in deciding the result, but on "form", either Barnwell or Pixton, both of them first-class flyers, mounted as they were on the fastest machines in the "field", should have won.

It was surmised that not one of the machines would return in its proper element, and some thought it unlikely that any of the flyers would get half-way round. And it happened that every few minutes saw one of the racers out of the running, in nearly every case through losing the way. Telephone messages received at Hendon told a tale of failures, and in some cases gave rise to anxiety owing to the complete absence of tidings of some of the flyers.

Not until 5.35 was the first returning pilot discerned, and he was coming from an unexpected quarter. Clearly he was too far to the east, and it was taken for granted he had lost his way. He proved to be M. Louis Noel, on his Morane-Saulnier. When he landed he said he was sure he had seen all the "controls," although he admitted it was extremely difficult at times to see the ground when no higher than 300 feet. Pending official reports from the observers, it was assumed that M. Noel was the winner, and he was loudly cheered. Mr. Brock, on a similar machine, landed after an interval of two minutes. He came from the right direction.

The officials began to feel anxious as time passed and no other airman came to land, especially as Barnwell, reported at West Thurrock, was long overdue. Not until five minutes past six did another machine appear, and this proved to be R. H. Carr's Farman biplane. Then Lord Carbery on his monoplane was sighted flying high, far to the south, an evident strayer.

He had a tale of adventure to tell. He lost his way at West Thurrock, and landed there, reascending with the help of bystanders. Then he went far afield, and came down on Hampstead Heath of all places.

Pierre Verrier, meanwhile, had landed safely; and it was now possible to estimate the situation. One pilot, a Swede, had landed at Epsom; Mr. Pixton came down at Addington, near Croydon; J. Alcock never left the Hendon-Brooklands course, but continued his way to the Weybridge aerodrome, where he used to house his machine. L. A. Strange went to Wickham, in Kent; Birchenough went wide, and landed at Richmond; and Barnwell abandoned the race after passing West Thurrock, and went on to Brooklands. The fastest time was Mr. Brock's average speed of 72½ m.p.h.

The result of the race was as follows:

W. L. Brock (winner); R. H. Carr (second); P. Verrier (third).

Mr. Brock, shortly afterwards, was victorious in a race from Hendon to Manchester and back, 322 miles. He was a small, very wiry American addicted to chewing gum, and he was a great popular favourite. In the London-Manchester-London race his actual flying time, exclusive of the regulation halts at Manchester and Birmingham, was 4 hours, 42 minutes, 26 seconds, an average speed of 69 m.p.h. In the historic race in April, 1910, from London to Manchester—only half the distance—M. Louis Paulhan, the winner, flew at an average speed of 46 m.p.h.

In a big race in 1914 a very fast stage was flown by Lord Carbery on a Bristol " Scout " biplane. He flew from Hendon to Birmingham in $60\frac{1}{3}$ minutes, the distance being 91 miles. Lord Carbery lost his way near Birmingham and damaged a wing in landing.

The following also had mishaps:

Birchenough: a leak in the petrol tank when fifty miles on his way from Hendon.

Strange: damaged propeller getting away from Manchester.

Hawker: thick fog at Coventry, and indisposition.

Noel: lost way at Birmingham, landing on the racecourse. Damaged machine.

Carr: landed three times on his way out to Birmingham.

Hawker returned to Hendon from Coventry by air, but when he landed he was evidently suffering, and was unable to speak. It will be remembered that Hawker had on previous occasions been compelled by indisposition to abandon flights. On this occasion he recovered quickly and gave a looping display.

M. Noel's first landing was near Coventry. He was short of petrol and borrowed some from a lady motorist who happened to be passing.

I find the following notes on April of that year (1914):

" The increasing indifference of aviators to weather, and the growing interest of the public in flying, are making the aerodromes at Hendon, Brooklands, and Eastbourne recognised sporting resorts. At Hendon and Brooklands the number of flyers and machines is greater than ever, and it is a question of providing accommodation."

The big Easter Programme that year at Hendon provided for five days' flying.

Thursday	April	9	From 3	p.m.	Speed and altitude tests.
Good Friday	,,	10	,, 2	p.m.	12 mile speed contest for the "Shell" trophy, and looping - the - loop by Hamel.
Saturday	,,	11	From 3	p.m.	20 mile cross-country race and quick-starting contest

Sunday	April 12	From 3 p.m.	Special displays by Gustav Hamel, and exhibition flights by Hendon airmen.
Bank Holiday	,, 13	From 2 p.m.	Exhibition flights.
		At 3.15 p.m.	12 mile grand speed handicap for the Barclay Walker trophy, and looping-the-loop and upside-down flying by Gustav Hamel.

The following took part:

G. Hamel	Morane-Saulnier	Monoplane
P. Verrier	M. Farman	Biplane
L. Noel	M. Farman	Biplane
G. M. Dyott	Dyott	Monoplane
R. H. Carr	Grahame-White	Biplane
F. W. Goodden	Caudron	Biplane
P. Marty	Blériot	Monoplane
E. Baumann	Caudron	Biplane
M. Osipenko	Grahame-White	Biplane
R. T. Gates	Grahame-White	Biplane
E. R. Whitehouse	Handley Page	Biplane
L. A. Strange	Grahame-White	Biplane
W. Birchenough	Grahame-White	Biplane
J. M. R. Cripps	Grahame-White	Biplane
C. Grahame-White	Morane-Saulnier	Monoplane
Thelen	"Albatross" (German)	Biplane

One of the best Hendon stories relates to the period immediately after the War. A certain firm received a communication, apparently from the agent of a foreign Government and raising the question of terms for the supply of machines. The writer appeared to be fully authorised. He asked for permission to make a trial flight on one of the types required, and permission was granted and a visit to Hendon arranged. In due time the gentleman arrived on the scene and was shown the machine, and arrangements were made for a flight. He appeared somewhat at a loss, however, and when it came to dressing for the part he was reminded that a pair of goggles would be advisable. He made inquiries, and was directed to the stores office. Thither he went, and procured a pair of goggles on payment of a deposit of 15*s*. Then he got into the machine, the bystanders and mechanics doubting not that he was a fully-fledged pilot.

But the moment they started the engine and released the chocks from the wheels they were not so sure. He taxied across the field in a most erratic manner; and evidently something was wrong. He did not get off the ground, but went careering along desperately, finally taking the hedge at 55 m.p.h.

and turning right over. A car sped across the aerodrome, its occupants fully expecting to find a dead man. Happily, however, although the machine was reduced to a complete wreck, the pilot crawled out with apparent unconcern and without a word! He refused assistance, and walked back to the stores, where he returned his goggles and received his 15*s*. Then he walked quickly out of the aerodrome; and he was never seen again! Inquiries at the office of his country's representative elicited the fact that nothing was known about him nor about the proposed deal in aircraft. To this day the affair is a mystery. Was he a would-be air pirate? Did he imagine anybody might fly by the exercise of a little will power?

CHAPTER V

SOME OF THE PIONEERS (I)

Before Brooklands and Hendon became regular aviation centres, and even afterwards, there was much experimenting and a little flying in various parts of the country; and it is necessary to give some account of the practical work as well as of the scientific discussions, and the attitude towards flight of the general public and the Government. The difficulty is to know where and how to begin, but I think a reference here to the work of some of the individual pioneers will be the best and most interesting way, although it is not easy to avoid overlapping.

In the days of the " Blue Bird " at Brooklands, one would meet there at the luncheon hour a motley group of toil-stained experimenters, inventors, and pilots, whose vividly phrased conversation often drifted into pure aerodynamics. One heard the name of Mr. F. W. Lanchester mentioned, sometimes with considerable heat. He had his disciples, whose number increased with the passing of the years; and he had his opponents, who became fewer and fewer. Motoring owes much to Mr. Lanchester, and in aerodynamics he was making experiments and calculations thirty years ago. In 1907 he published that monumental work, *Aerodynamics and Aerodonetics*, and in the preface he wrote, " the time is near when the study of aerial flight will take its place as one of the foremost of the applied sciences." The work remains a classic which invariably pays those who refer to it on the occasion of any " new " problem arising.

Mr. Lanchester was appointed to the first Government Advisory Committee on Aeronautics. During the War he wrote *Aircraft in Warfare*, in which he expounds the " N-Square law ", and applies it to the battle of Trafalgar, concluding with the words, " Nelson, if not actually acquainted with the N-Square law, must have had some equivalent basis on which to figure his tactical values." Then follows the application to air raids and aerial warfare generally.

I have referred elsewhere to Mr. G. B. Cockburn, and would here merely record the fact that when the Aeronautical Inspection Department was formed he became second-in-command to the late Colonel Fulton; he was afterwards put in charge of the Investigation of Accidents Department at the Air Ministry; and there never was a better appointment. His name is but little known to the public, for he did not settle down to the career of an aviator, but turned his attention to the scientific side of flying. Mr. Cockburn, who had a machine on Salisbury Plain at the end of 1909, was granted the fifth Royal Aero Club certificate. He had learned to fly at Mourmelon, with Henry Farman; and it is recorded that " he met with a fall after a good flight " on July 5, 1909. He became the owner of one of the very first Gnome-Farmans, in which he competed for the Gordon-Bennett Aviation Cup at Rheims, in August, 1909, the only representative of Great Britain. It was after this that he managed to persuade the military authorities to allow him to erect a shed at Larkhill, on Salisbury Plain. He spent the winter of 1909-1910 on the Plain. At the Wolverhampton meeting he won a prize of £100 for getting off the ground in the shortest distance, 100 feet 5 inches. After this he gave himself up entirely to giving instruction in flying on Salisbury Plain. Among the officers he taught to fly were Lieuts. D. Conner and H. R. Reynolds, and the late Colonel (then Captain) J. B. Fulton. Later on, as already mentioned, when Sir Francis McClean lent his machines for the instruction of the first Naval flyers, Mr. Cockburn volunteered his services as instructor.

A few readers may remember a " mystery of the moors " in 1907. Report said that a wonderful secret flying machine was undergoing trials somewhere near Glen Tilt in the Perthshire Highlands. There was, indeed, a remarkable aeroplane there, but it did not fly at that time, for with a 15 h.p. engine it was under-powered, and the moorland made difficult country. The machine was the Dunne automatically stable aeroplane, and no sooner did news of it leak out to the press than the place was besieged by spies, some of them Germans; and the Marquess of Tullibardine (now Duke of Atholl) placed a cordon of gillies round the place, whilst boys volunteered to guide visitors, but were careful to take them in the wrong direction.

Major John William Dunne is the son of General Sir J. H. Dunne, and was born in 1875, in Ireland. After being invalided home from the South African War he studied reconnaissance, and was thus led to the idea of the flying machine. He studied the subject, and when he returned to South Africa in 1903 he left his notes with his friend, Mr. H. G. Wells. Soon after came the news that the Wright brothers had flown, and Major Dunne thereupon decided to concentrate on the problem of stability.

One of the most fascinating papers ever read before the

Royal Aeronautical Society was his study of aeroplane stability, with its illuminating references to the seed-bearing leaf of the Zanonia tree, a leaf provided with wings which ensure effective distribution. But the theory of his machine and the long story of his trials cannot be given here fully. The aeroplane, first a " pusher " monoplane, was shaped like a shallow V, the apex forward, and with the angle of incidence at the apex greater than at the left and right extremities. Later he built a biplane. He joined forces with the late Professor Huntington, and the machine became known as the " Dunne-Huntington "; and he was assisted in workshop research by the late Sir Hiram Maxim. At Eastchurch I saw him fly, but I was never fortunate enough to go up in the Dunne.

During Major Dunne's second visit to Perthshire, in 1908, there was a renewal of the newspaper stories. The first flights were made, and Major Dunne being refused permission to fly on account of bad health, the pilot was Lieut. Lancelot Gibbs. At the end of that year both Major Dunne and Mr. Cody were informed that the War Office had decided to discontinue experiments in aeronautics! But soon afterwards Lord Tullibardine formed the Blair-Atholl Syndicate, and a bigger machine was built with a 50 h.p. Green engine, and permission was now given to Major Dunne to fly himself. At Eastchurch I saw Major A. D. Carden, who possessed only one arm, fly the Dunne machine.

Major Dunne had been disappointed with the performance of his aeroplane, and he decided this was not the fault of the machine, but that none of the pilots had the courage to put its qualities to the real test, and what was needed was a little rashness. This he proposed to display on his very first flight. He started taxying from the top of a slope and ran to the end of the big field, only then taking off, and doing this by pulling the lever hard back so that for a few seconds all he could see was the sky. But the next instant the machine was on the level, and he let her go straight on; then the engine stopped and she landed herself while he was reading his instruments! He made many flights without touching the controls, for when the engine stopped the machine simply settled down in the right attitude. Mr. Orville Wright visited him at the aerodrome.

Major Dunne tried the experiment of loading the tail heavily in order to produce the worst possible conditions. The biplane, despite this handicap, would itself take up the angle and attitude for the maintenance of its flying speed, but the monoplane landed pancake-wise from about fifty feet and broke to pieces all round the pilot, who was unhurt.

On Major Carden's Dunne machine a French pilot was trained for the Astra Company, and Mr. N. S. Percival also flew it, and took up Major (now Air-Commodore Sir) R. Brooke-Popham as the representative of the Royal Aero Club. Commander Felix flew a Dunne machine fitted with an 80 h.p. Gnome from Eastchurch to Paris "hands off"; and soon afterwards, Mr. W. Starling Burgess, an American aeroplane constructor, obtained leave to build the type in the United States. There it was flown as a seaplane. The type was flown in America after the War; but no doubt, as a War machine, it was not sufficiently manœuvreable.

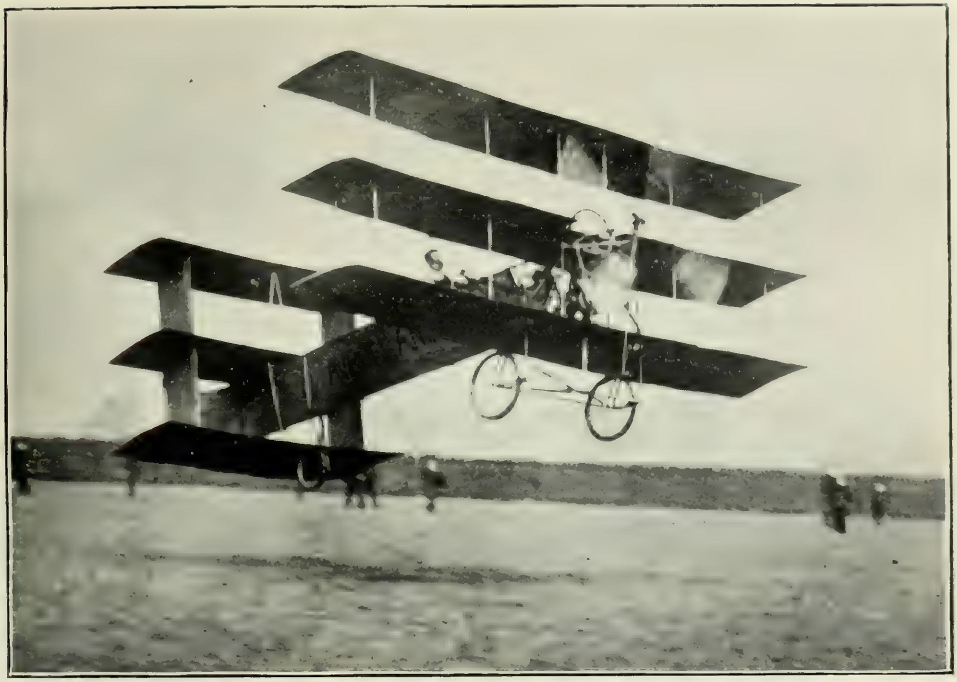
Major Dunne's health broke down about the end of 1913, and he made over the rights to Armstrong-Whitworth, and then the War made him busy in other directions.

The first British subject to fly was Mr. Henry Farman, who is by birth an Englishman, although he has become a citizen of France. Mr. A. V. Roe was the first Englishman to fly in England, and Lieut.-Col. J. T. C. Moore-Brabazon, after Farman, was the first Englishman to fly anywhere, but he made his first flight in France.

When Lieut.-Col. Moore-Brabazon won the prize for the first flight of one mile on a British machine the late Hon. C. S. Rolls had never piloted an aeroplane, and Mr. Moore-Brabazon allowed him a week to try and win the Salomans prize, although it could have been claimed *ipso facto* by Mr. Moore-Brabazon on winning the other prize. Rolls did a half-mile flight within the week, and won the Salomans prize, making public acknowledgment of the circumstances.

But to return to Mr. A. V. Roe. He was born at Manchester in 1877, and was educated at Shepperton and St. Paul's School. He went out to British Columbia with the idea of becoming a surveyor, but the affairs of that country being disturbed, he turned his mind to other things, and eventually returned to England and apprenticed himself to the Lancashire and Yorkshire Railway Company's locomotive works. Then he went to Portsmouth Dockyard, and afterwards to King's College, to study engineering. Although brilliant in engineering he failed to pass other examination subjects. He was, in fact, spending much time inventing, and he made gliders and won prizes at an Aero Club exhibition at the Agricultural Hall. He even went in for cycle racing.

His inquiring mind induced him to make a two years' tour of the world, and during that period, in 1906, he made up his mind to build an aeroplane. In England he got no encouragement, and an engineering supplement of a well-known journal



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Mr A. V. Roe in his Triplane, 1908

declared with regard to two of his models " all attempts on the basis he describes are not only dangerous to human life but are foredoomed to failure from an engineering standpoint." Early in 1908 he moved to Lea Marshes where he found a suitable railway arch for his workshop. Here, on his aeroplane fitted with a 9 h.p. J.A.P. engine, which he had substituted for an Antoinette, he made flights. He took this machine to the Blackpool meeting. I saw him fly at Lea Marshes, and often at Brooklands.

In 1910 his brother, Mr. H. V. Roe, became his partner, and the two started the aeroplane works at Brownsfield Mills, Manchester, with a 35 h.p. Green and a 35 h.p. J.A.P., for which they built two triplanes. Mr. H. V. Roe was in the cotton industry and with him Mr. John Lord was associated. The latter now became identified with aviation, and he has shared in the triumphs and in the responsibilities of a firm whose business during the War expanded enormously. Mr. John Lord is one of the most striking and best liked personalities in the industry and in the Royal Aero Club. With Mr. H. V. Roe's decision to join his brother, the attitude of the family, which had considered aviation was a hopeless game, changed. The firm entered for the second Blackpool meeting, but the railway truck containing their machine caught fire. On the next day a new machine was being built, and four days afterwards it was ready for flight. At Blackpool Mr. A. V. Roe had three crashes. After visiting America he made the first tractor biplane, a notable departure from the usual practice, and one destined to have important results. From it developed the standard Avro training machine, which remains to this day one of the most used types. It saw active service in early days of the War, and was adopted for training not only by the French but also by the United States Government. I suppose that no type of aeroplane has been made in such large numbers as the standard Avro, the airman's ideal, for it is wonderfully manœuvreable, and is easy to land. And from the same brain has come other remarkable types, some of which are used by the R.A.F., while one of the latest is the "Avian", which at the Lympne Light Aeroplane Tests in 1926 proved capable of carrying a greater proportion of useful load to Air Ministry specified structure weight than had ever before been attained. Mr. Roe secured the eighteenth pilot's certificate issued by the Royal Aero Club.

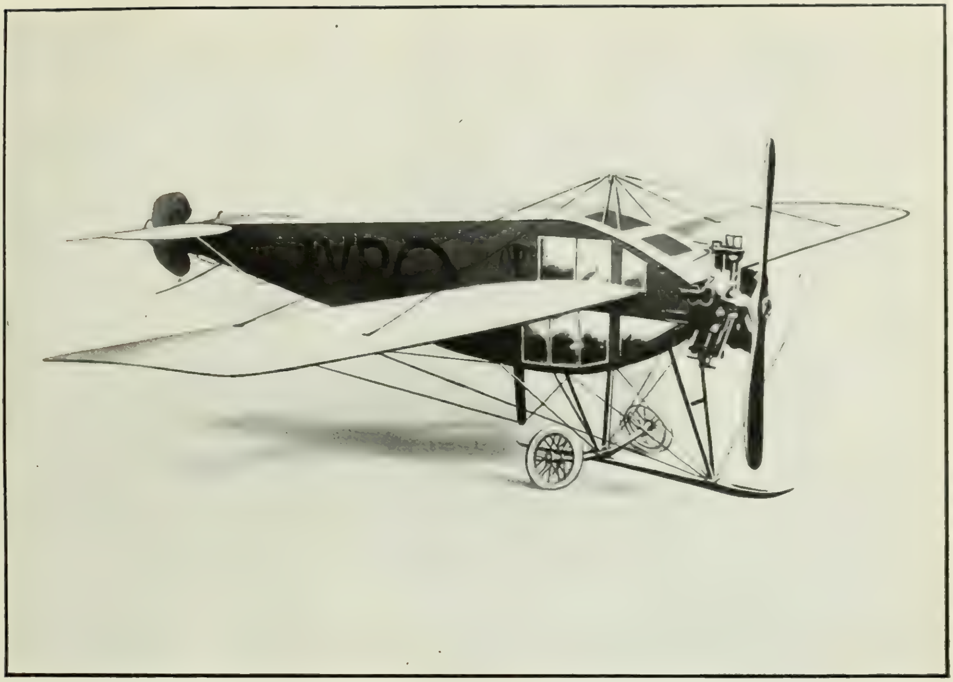
He has a devoted staff of designers, draughtsmen and pilots, whilst a tower of strength in the managing side is Mr. John Lord; and between them they are always thinking out the numerous problems of a branch of engineering which is still in its infancy. But Mr. Roe cannot be circumscribed by conventional boundaries; his mind reaches out to every field in which the inventor's genius can find play.

In the chapter on Eastchurch Aerodrome the three Short Brothers were referred to. I first met the late Horace Short in 1903, when he was engaged on problems of acoustics. He had lately travelled in Africa, and he was eloquent on the subject of the peace that is to be found in the "wild", and said that he longed for the untainted air of the great solitudes. He had been associated with Sir Charles Parsons, and his brothers had been interested in balloon manufacture, and had made a balloon as long before as 1898, Mr. Eustace Short being the leading spirit and sometimes taking his brother, Oswald, then fifteen years of age, on balloon trips. Horace Short went to Mexico and when he returned he became associated with Colonel Gouraud, U.S. Army, in microphone experiments. Eustace and Oswald Short worked with them, and they went to the Paris Exposition of 1900, and there met many balloonists. In 1904-5 they put in for the contract of making balloons for the Indian Government, and were successful, and this brought them to the notice of Mr. Frank Hedges Butler, the Hon. C. S. Rolls, and other moving spirits of the Royal Aero Club, and they became the Club engineers. For many years they retained their interest in the lighter-than-air division. They supplied the cover, gas bags, and other details for the first Naval rigid airship. They made kite balloons and established the big airship works at Cardington near Bedford during the war.

In 1907 they made a glider for Mr. Moore-Brabazon, but the first aeroplane designed by the new firm was one for Mr. Frank McClean, and it was exhibited at the Olympia Show in 1909. About that time Wilbur and Orville Wright, whom they had met at Pau, commissioned them to build six Wright machines for which British clients had given orders. It was on an all-British machine, built by Shorts and fitted with a 60 h.p. Green engine, that Mr. Moore-Brabazon won the *Daily Mail* prize already mentioned.

Horace Short was the authority on the flying machine generally, while his brother Oswald specialised on seaplane floats in which department the firm still occupies a supreme position. Further references to their work will be found in the chapter on Eastchurch.

Another pioneer was Mr. Horatio Barber, whose "call" to aviation came about the time of the Wright brother's first flights in Europe and the first Aero Show in Paris. Mr. Barber



Avro enclosed-cabin Monoplane

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had been travelling in Europe, but he now decided to return to England; and we soon find him hard at work in a railway arch at Battersea. Later he moved to Salisbury Plain, where, in 1909, he built a "Canard", or tail-first aeroplane. The tail-first class of aeroplane was tried by other early designers. (In the present year, 1927, it has been hailed as a new idea !). Mr. Barber's next was the "Valkyrie". At this period Mr. W. O. Manning was with him.

One of Mr. Barber's "Valkyries" had two front skids connected by a horizontal bracing wire. Taxying this machine on the Plain on one occasion the wire caught a mole hill, with the result that the two skids closed together and the whole machine collapsed, but with no injury to the pilot. It was certainly an amusing crash to see. Mr. Barber's chauffeur got into one of his aeroplanes in order to test the engine. He put the engine full on, however, and before he realised what he had done the machine was in the air! Another crash, but no great harm done.

Later Mr. Barber took the "Valkyrie" to Hendon, where he gave me two or three flights in it. "Where ignorance is bliss it is a folly to be wise." I did not know how very skilful the pilot had to be on that machine. But it must be remembered that it was an entirely novel design, one of the tail-first class, an experiment, and Mr. Barber's work was valuable, and his workmanship was exceptionally good. He followed with other and improved designs, particularly the "Viking", and in 1911 presented four complete machines to the Government, their engines being 30 h.p., 40 h.p. and 60 h.p. Greens, and a 50 h.p. Gnome. On one occasion he carried a cargo of filament lamps from Shoreham to Brighton, probably the first freight transported by aeroplane for a fee. He made several, long, cross-country trips, and he presented the Britannia Trophy to the Royal Aero Club to be awarded annually to the pilot who makes the best performance of the year.

Mr. Barber gave up flying and went in for research and development. He also became much interested in airships. One of his biggest services to aviation was in the establishment of aviation insurance, in which he became associated with Lloyds, and, indeed, founded that part of Lloyd's business. In the War he was an instructor, and specialised on stunt flying, writing two books, both of which were adopted by the Service here and in America. One of them, called *The Aeroplane Speaks*, is an unconventional, but entirely satisfactory, introduction to the theory of flight; and the other, called *Aerobatics*, is an exposition of advanced flying. Mr. Barber, although by no means the traditional intrepid, dare-devil airman, went up and tried many new stunts, and thought about them all the time.

I now come to a name known all the world over, and identified with the two-engine type of aeroplane used extensively for bombing in the latter months of the War, and with a series of multi-engine commercial machines used on British air routes; I refer to Mr. Handley Page. Since the War to many people a big aeroplane is a "Handley Page", and there is a story concerning a visit of a party of sighseers to a certain aviation works in no way connected with Handley Page, and the innocent question to the head of the firm put by one of the visitors who had been shown a number of small machines in various stages of construction.

"And shall we see your Handley Pages?"

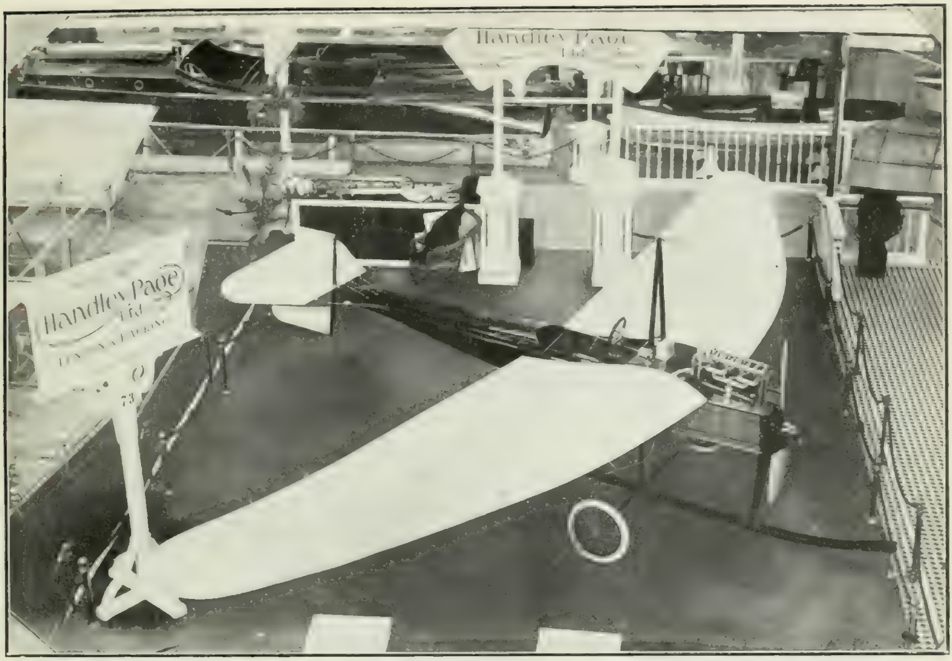
I met Mr. F. Handley Page soon after he first turned his attention to flying, and I recall the fact that he was very early a believer in inherent stability to be obtained by the use of wings resembling those of the bird.

He first studied for the profession of electrical engineer, but was drawn from what promised to be a successful career by the wonderful new vision of mechanical flight. It was in 1908 that he decided to inaugurate a business of his own, and in June of the next year this was made a limited company with works at Barking, the first works in this country solely for aeroplanes. The Handley Page was the first registered aviation company (June 17th, 1909); the British and Colonial Aeroplane Co. was formed in October 1910; Mr. A. V. Roe's was installed as a company on June 11th, 1913. Adjoining the Handley Page works were the marshes intercepted by dykes, not a very suitable aerodrome. But there was a big mound, formerly a rubbish heap, with a steep, grass-covered slope, and here Mr. Handley Page could test gliders.

The first Handley Page machine was a small monoplane designated the "Blue Bird", a name given to a large number of machines since that time. The wings were bird-shaped, and the colour blue. The next type was an experimental biplane built for Mr. W. R. Thompson.

A portion of the works was set aside for propeller design and manufacture, and Handley Page propellers became widely known.

The firm turned out machine after machine. One, called the "antiseptic", being painted with a non-rust composition, was flown by Mr. Edward Petre, but was wrecked. After it had been repaired it was flown across London, the first aero-



Handley Page Monoplane at Olympia, 1911

plane to perform that feat. This machine is still on view at the Cricklewood works to which Handley Page moved in 1912. An inherently stable type of monoplane, which was about to be adopted by the Admiralty, crashed at Wembley Park in December, 1912, and the pilot, Lieut. W. Parke, R.N., and A. A. Hardwicke (Mr. Handley Page's chief assistant) were killed.

A later machine, a biplane sold to Mr. Rowland Ding, and fitted with a 100 h.p. Anzani engine, was flown across the Channel by Mr. Ding with Princess Lowenstein Wertheim as passenger.

At that time there were few facilities for flying, and but little data from which to obtain the strength or performance of an aeroplane. Aero engine design was hardly developed at all. There were no good aerodromes, no trained pilots, and each aspirant to flight was his own instructor. Yet in spite of all this Mr. Handley Page, through his faith in aeronautics and by his forceful personality, was able to impress commercial men, and obtain support. All these years he has been a leading spirit in the scientific development of the flying machine, with due regard for what may be called unorthodox possibilities. Some time in 1916 I discussed with him at Cricklewood the possibilities of a wing with several narrow, stepped planes divided by slots like the old Wenham glider, but with the "venetian blind" sloped back, and the apertures only wide enough to permit of the passage of air. Such an arrangement would, of course, give a big lift, but this would be obtained at the expense of excessive air resistance, or drag. Ideas of the kind had been entertained by many students, but it was Mr. Handley Page who first made a slotted wing practicable, and the principle is to-day exploited with success in more than one established type, and extensively in the slotted aileron, which is of great value in keeping control at less than stalling speed.

I always associate Mr. Handley Page with Mr. A. V. Roe in a category of designers who look into the future, and refuse to be strictly bound by the conventional as dictated by the need of the moment. He is always to the fore in any new experiment. Thus, when the Germans led the way in the gliding movement, he hurried over to Germany and saw what they were doing, and promply got into communication and association with some of the leading experimenters. And on occasions when I seek illumination on some question of advanced theory I know where I shall unfailingly get it, and where it will not be dismissed as chimerical, at any rate without good reason given; on such occasions I go to Mr. Handley Page or to Mr. A. V. Roe.

But in saying that I do not mean there are no others, but merely that these two stand out distinctively, and one feels that at any moment from one of them may come some novel, remarkable, and revolutionary development of the flying machine.

Mr. Handley Page does not fly himself, but the reference reminds me of the wager he made with Mr. Pemberton Billing. I do not remember which of them was the challenger, but the stakes were to be given to him who learned to fly in a day. Mr. Pemberton Billing no doubt began with a practical advantage, for about 1908 he had had a machine, and had almost flown it. At any rate, he won the wager. Mr. Handley Page, flying his own monoplane at Hendon in one attempt certainly got off the ground, and landed again. He landed in a somewhat bouncing fashion, but without doing any damage, and on getting out asked a friend.

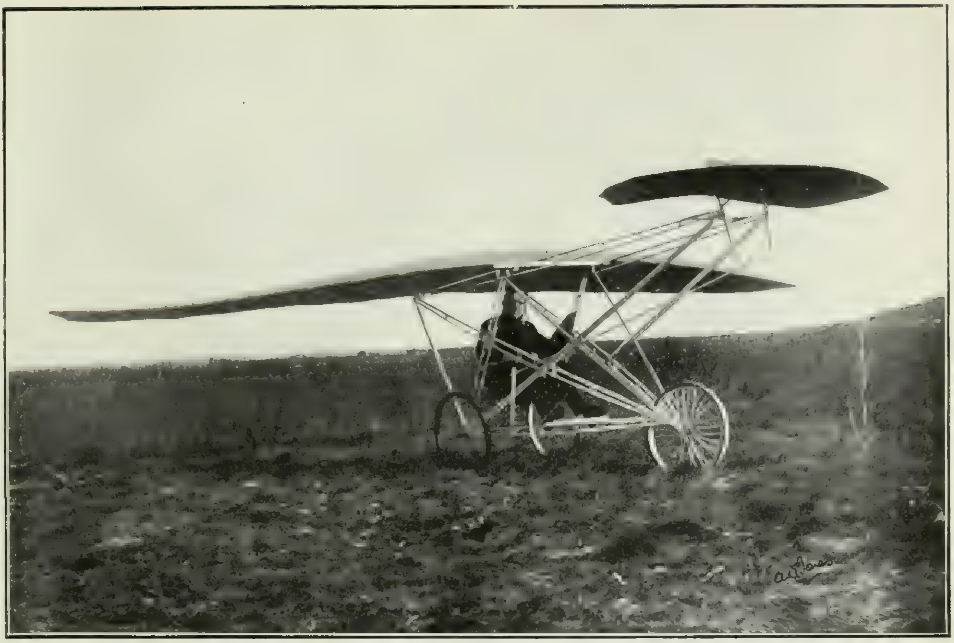
"Did you see my landing?"

"I saw them all," was the reply.

Another pioneer whose name is associated with many successful types of aeroplane, but who has played a less conspicuous part in public discussions, and spends most of his time at his works and his home in Yorkshire, is Mr. Robert Blackburn, who flew a machine of his own design at Saltburn in 1909. This machine was a monoplane with a 35 h.p. Green engine, but eventually it was wrecked. How many machines were wrecked in those days through sheer ignorance of the art of flying! In estimating the qualities of the early types a very big allowance ought to be made for the fact that few knew how to fly anything. To-day it would be easier to give a fair judgment. Mr. Blackburn's brother, Norman, then, I think, a boy of fifteen, actually succeeded in making a short, straight flight about this time. Later on he was to serve as a pilot in the War.

Blackburn monoplanes were much to the fore in 1912 and one of them won "The Wars of the Roses Cup". The firm has become famous for its flying boats and other sea aircraft.

One of our first aircraft designers, and an early associate of Mr. A. V. Roe, was Mr. Howard-Flanders. With the late E. V. B. Fisher he attended the first Rheims meeting, and he had introductions to some of the aviators there. In November, 1909, he joined Mr. J. V. Neale as manager, unpaid, like many other hard workers at that time. Men like Howard-Flanders spent every penny they had on their work, and it must not by any means be assumed their failure to make fortunes was due to any defect. Chance played a big part in these matters; and the War came along and upset



Handley Page on Monoplane Glider

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everything, so that actually much of the industrial success of aeroplane manufacture went the way of men who until that time had never bestowed a thought or a penny on flying, and who, immediately the War was over, cleared out, in more than one case the recipient of high honours.

Mr. Howard-Flanders was a sound designer, who won the respect of all. One of his achievements was a biplane of very clean design, and possessing a high degree of inherent stability. Undoubtedly he had been led to believe the War Office would give an order for it, and he did get an order for four monoplanes. He was actually reconstructing the under-carriages for the monoplanes when the War Office decided to prohibit monoplane flying in the Service (a matter referred to elsewhere).

Mr. Howard-Flanders expressed himself vigorously on the subject at a meeting of the Aeronautical Society, and his remarks, it is to be feared, counted against his interests. Shortly afterwards he was injured in a motor cycle accident, and his firm closed down. After the War he had much to do with the founding and direction of the Institution of Aeronautical engineers.

Few people probably are aware that the British aeroplane industry at one time had its principal home in a railway arch at Battersea, which Mr. Howard T. Wright tenanted. He had been trained as a mechanical engineer at his father's works at Tipton, and eventually sold those works to Sir Hiram Maxim, and for a time worked with the purchaser on his famous captive flying machine. In 1907 he started his aeroplane workshop under the railway arch and received an order to build a helicopter with two big propellers driven by a 30 h.p. Antoinette engine. This machine was actually tested on Norbury Golf Links in 1908, and lifted itself two feet, but without the pilot. The weight raised was 1,250 lbs. It was taken to Naples, and its inventor, Signor Capone (not to be confused with Caproni) ordered two more machines, a helicopter and an ornithopter.

One of Mr. Howard Wright's first machines was a pusher biplane built for Mr. Seton-Karr; it was the first enclosed-nacelle biplane ever built, all previous types seating the pilot "out on the scaffolding" so to speak. It was largely of metal construction. It had a 35 h.p. Metallurgique engine, and two concentric propellers running in opposite directions. This machine was tested at Fambridge, but I have no record that it ever flew.

Mr. Howard Wright built several pusher biplanes between 1907 and 1911, one of them that on which Mr. T. O. M. Sopwith won the De Forest prize for the longest flight on a British aeroplane from England, landing on the continent, the same machine also winning several prizes in America. Another was supplied to Captain E. M. Maitland, and another to Mr. Robert Loraine.

Closely associated with Mr. Howard Wright in the early years was Mr. W. O. Manning, and when the firm was sold to the Coventry Ordnance Company in 1911, both of them joined that Company. In 1912 Mr. Howard Wright joined Samuel White & Co., at Cowes, and designed the double-camber aeroplane, a very interesting experiment.

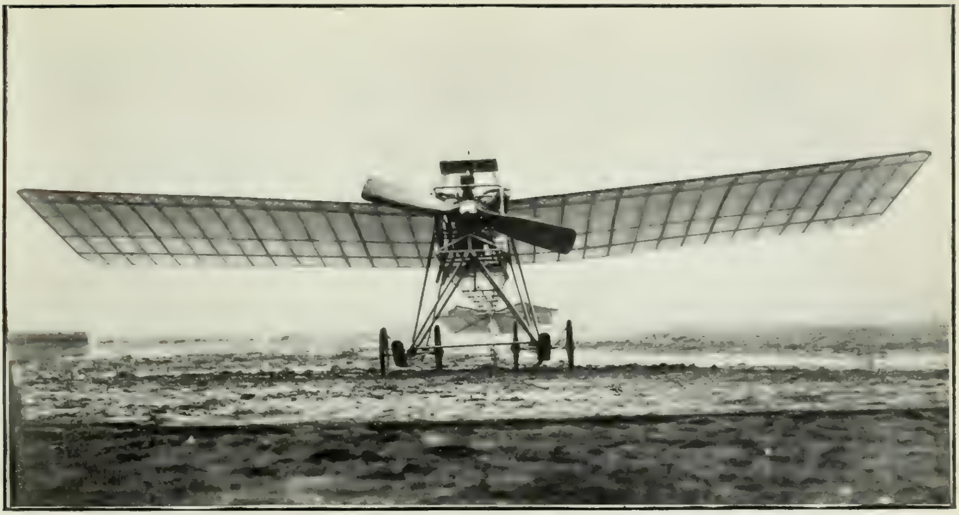
Mr. Manning was for long a member of the Brooklands community. He had done a lot of experimental work before he joined Mr. Howard Wright.

In November, 1914, he joined the Naval Air Service as Lieut. R.N.V.R., and he was at the Repair Station, Port Victoria, Hendon, and then at the Air Department of the Admiralty. He left there to take charge of the Air Department of the Phœnix Dynamo Manufacturing Company, and while there designed the "Phœnix Cork" (with the exception of the hull), a type of flying boat that did very useful service in the War. He also designed a big multi-engine Phœnix "Pulex" flying boat. Mr. Manning was a member of the Accidents Investigation Committee of the Royal Aero Club as long as it existed, a committee that did a great deal of useful, but rather thankless, work. As chief designer for the English Electric Company he produced notable post-war designs.

One of the few designer-pilots is Captain F. S. Barnwell, and he and his brother, the late R. H. Barnwell, were at work in the aeronautical field long ago. They had gliders, and had actually built a small light aeroplane for a 5 h.p. Peugot engine, in 1900, but without success. One of their machines was a twin-screw, tail-first machine.

They worked separately, for the most part on different types, and they both made good, the elder, R. H., being the better-known pilot, although his brother modestly claims he also was the real pioneer designer.

The late R. H. Barnwell joined the Vickers firm, and worked for it until he was killed in an aeroplane accident. His brother, in 1911, joined the Bristol aeroplane firm as assistant to M. Henri Coanda, the technical director, and with Mr. (now Wing-Commander) H. R. Busteed designed the famous Bristol "Scout". Captain Barnwell became chief designer for the firm in 1916, and was responsible for some of the very successful "Bristol" types; but he also served with distinction in France, although he could easily have obtained exemption from service as an "indispensable". He is still with the Bristol Company.



Howard Wright Monoplane

I now come to a pioneer whose name is familiar to all, Mr. T. O. M. Sopwith, who first became known as a pilot in the summer of 1910, taking his certificate, No. 31, on the Howard Wright biplane, the identical machine on which I had my first flight. Mr. Sopwith was early convinced in favour of the biplane, which he claimed could be given a range of speed unknown in the monoplanes of that day. The "tabloid" biplane turned out from his workshop at Brooklands had an epoch-making influence on aeroplane design. At that time monoplanes were at the height of their popularity, but the "tabloid" easily beat all its rivals of equal engine power. Its range of speed was 36-92 miles per hour.

By 1912 Mr. Sopwith was much in the public eye. He had won the Baron de Forest prize; he had been presented to the King and Queen at Windsor, where he had been commanded to give an exhibition flight; he had been to America, and carried all before him there; in the Aerial Derby in June, 1912, he arrived first at the goal. He has a genius for choosing the right man for the right job, and the men who work, or have worked, for him are almost as well known as himself in flying circles (Harry Hawker, Mr. F. Sigrist, Mr. R. O. Cary, Mr. C. H. Pixton, and Major P. W. S. Bulman, for example).

The success of the "tabloid" made it necessary to have larger premises than the workshop at Brooklands, and a move was made to Kingston-on-Thames; and who is not familiar with the names of "The Snipe", "The Camel", "The Pup", and later the "Horsley" and other machines which came from this firm.

As already stated, Sir (then Mr.) F. McClean offered his machines to the Navy for the instruction of the first Naval flyers, and what was afterwards the Naval wing of the Royal Flying Corps thus had its birth. I am not sure how many aeroplanes Sir Frances has owned, but before the end of 1910 Short Brothers had supplied him with sixteen; and it was largely due to his support that they were able to carry on in the early days.

In 1908 he took part in the Gordon Bennett Balloon race from Berlin, assisting Mr. Griffith Brewer, who was piloting. In this race Colonel Schaek, the winner, and some of the other competitors came down in the sea, and the American balloon the "Conqueror", burst in view of thousands of onlookers; the envelope acted as a parachute, however, and the occupants escaped. The following year Mr. McClean also piloted a balloon, and his assistant was Mr. Mortimer Singer. They were up over eighteen hours, and landed in Bohemia.

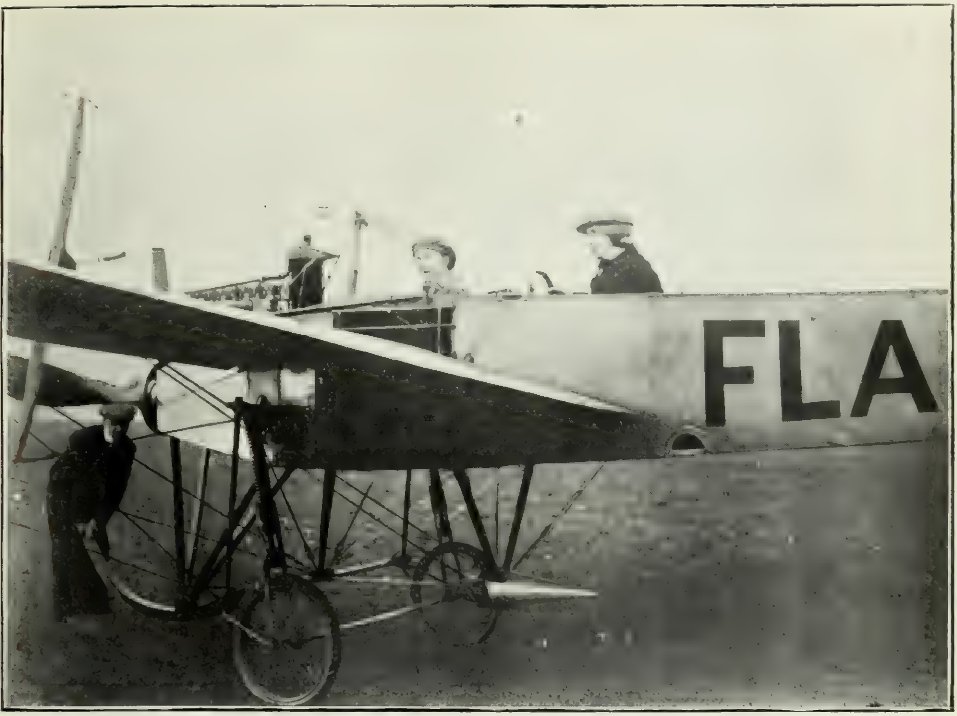
In December, 1908, he made his first ascent in an aeroplane, as a passenger with Wilbur Wright at Le Mans, and in a few weeks he had ordered his first machine, a Wright, from Short Brothers. This was delivered in August, and a few flights were made in it. In November he became the owner of another machine (Short Wright No. 3), and on this he made flights at Eastchurch. From July to November, 1910, he flew over 6,000 miles, and carried many passengers. He owned the first twin-engine machine that ever flew (it had three propellers), and he also bought Short No. 17, the " Vacuum Cleaner ". Afterwards he had Short No. 70, a four-seater seaplane, pusher type, with 160 h.p. Gnome.

In August, 1912, he flew up the Thames on his seaplane, passing between the upper and lower part of Tower Bridge and under London Bridge. Afterwards he took his four-seater to Egypt and flew, following the Nile, from Alexandria to Khartum. He was accompanied by Mr. A. Ogilvie and his mechanic all the way, and at various stages of the flight by Miss A. McClean, Mr. Horace Short, Mr. J. H. Spottiswoode, and others. He was a pioneer in air photography of the sea bottom when, in 1912, he reconnoitred the position of the sunken "Oceana," near Eastbourne. On August 6, 1914, he joined the Royal Naval Air Service, and went on Channel patrol, afterwards becoming instructor at Eastchurch.

The reference to aerial photography reminds me that Dr. W. J. S. Lockyer with whom Sir F. McClean was early associated in astronomical work, took innumerable photographs from aeroplanes at Eastchurch and elsewhere, his pilot usually being Sir Francis.

For many years Sir Francis has been a member of the Royal Aero Club Committee, and was at one time chairman—a very popular and able one—of the Club. He was awarded the Gold Medal of the Club for his services to aviation, and in 1926 was knighted.

Some people imagine that the airman's career is a short one and that all airmen are youngsters. As a matter of fact there are hundreds who have been flying for more than ten years, and some carry on into middle age. Captain Geoffrey de Havilland began flying in 1910 and has been flying ever since. In him are combined in rare excellence the widely different qualities required in the making of an engineer, a scientist, and a sporting aeroplane pilot. He uses an aeroplane constantly for the transportation of his family from place to place, and he flies in air races. Like Mr. Sopwith, he is the father of a large family of aeroplanes, and the British Air Service has



Flanders Monoplane.
Mr A. D. Jones and the late E. V. B. Fisher
(See page 81)

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always been, and still is, and probably long will be, largely dependent on D.H.'s, Sopwiths', Avros, and Bristols.

Captain de Havilland acquired his technical training at the Crystal Palace School of Engineering. Then the motor-car industry drew him, and he spent some time in the drawing office of the Wolseley Company. Following this, he continued to gain experience with various other motor-car firms.

He designed an aeroplane in 1909, and its wrecking on his first attempt at flight did not deter him in the least. He proceeded to design and build a second machine; and with this, a biplane, he managed to do so well that he was able to teach himself to fly. When, in 1911, he joined the designing staff of the Royal Aircraft Factory, this machine was still so sound that the Government purchased it. He was responsible for the design of the B.E.1 and largely concerned also in the design of the B.E.2 and the B.E.3, and of the R.E.1, R.E.2, and S.E.1. Another fact worth recording is that in 1912, with a B.E.2, he established a height (with passenger) record—his passenger being none other than Major (now Major-General Sir) F. H. Sykes.

The year 1913 found Captain de Havilland serving as Chief Technical Inspector of the A.I.D. Then, early in 1914, came an event which was of outstanding importance. But to understand the position one must go back a little. In 1911 Mr. G. Holt Thomas had established the Aircraft Manufacturing Company, chiefly for building Farmans in this country. But Mr. Holt Thomas was not content until his firm had a designing department, and he chose Captain de Havilland. The importance of this step was soon to be proved. A long and successful series of aeroplanes was produced. Some time after the War the Aircraft Manufacturing Company ceased operating and the De Havilland Aircraft Company was established.

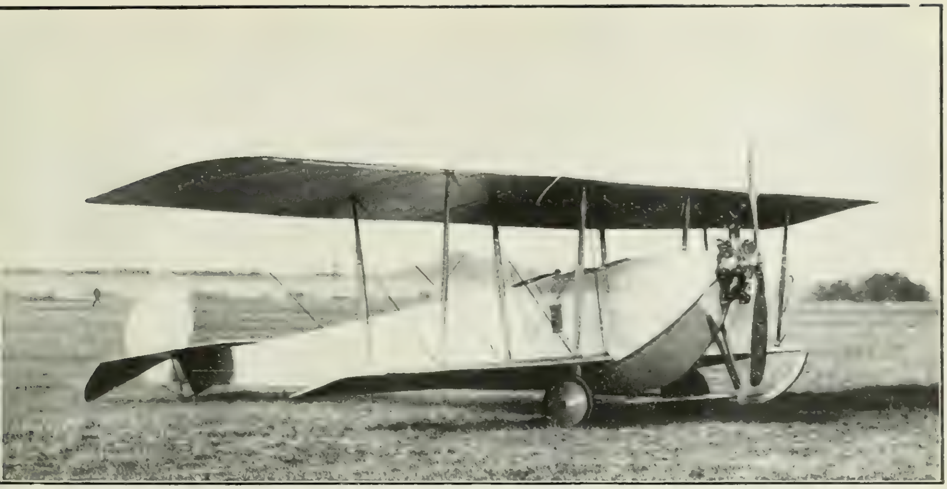
One of the greater figures in the aeronautical movement is Mr. (now Lieut.-Col.) Alec Ogilvie. Both in England and in any aeronautical assembly throughout the world his name counts. It was in October, 1908, that Mr. Ogilvie determined to take up flying seriously, in partnership with Mr. T. P. Searight, though, years before, when at Cambridge he had paid a visit to his old school (Rugby) and lectured on aeroplanes.

The narrow escape of his brother, who was collaborating with him in one of his early experiments, proved a salutary warning of the risks incurred. He had made a quadruplane glider on a four-wheeled chassis designed to be towed by a car at sufficient speed to rise into the air, the pilot controlling its stability. The glider was unexpectedly lifted thirty or forty feet up when the towing line broke, and there was a complete wreck, his brother falling through the four planes, luckily unhurt.

In October, 1908, Mr. Ogilvie went into partnership with Mr. Searight. He visited the Aero Show at Paris on December 12, saw Wilbur Wright flying on December 16, and ordered a Wright machine on December 29. In the following January he established himself at Camber, near Rye. The aeroplane was delivered at Eastchurch on October 25, and Mr. Ogilvie and Mr. Searight towed it by motor car to Camber. On November 7 Mr. Ogilvie made his first flights in it, and continued his flights until December 17, when he crashed. On January 19 he had a flight with the late C. S. Rolls at Eastchurch, and soon afterwards decided to instal a N.E.C. (a two-stroke type) engine in his machine. I have reason to remember the N.E.C. engine, for I went to Camber to observe Mr. Ogilvie's attempt in the Michelin Cup competition. The two brothers Mort, the designers of the engine, also were staying with him. The engine was very obstinate, and when it did decide to be "good" the wind blew half a gale!

Mr. Ogilvie obtained his certificate, No. 7, on the British list on May 15, 1911. He went to America every year and, with Mr. Griffith Brewer, had many associations with the Wrights. He flew at the Bournemouth, Wolverhampton, and Lanark meetings. He won a slow-speed contest with a speed of 24 m.p.h. He did a lot of flying in America, including work on a machine with a span of only 20 feet, with a view to the Gordon Bennett—that Gordon Bennett in which Latham's machine began to break in the air, and Leblanc fouled a telegraph post with his propeller, cutting the post clean through, scarcely hurting himself, but smashing his machine to atoms. In 1913 Mr. Ogilvie took up Mr. H. G. Wells for a flight.

In the meantime, since the end of 1912, he had been working continuously on his Air Speed Indicator, and it was actually used in the 1913 Navy manœuvres. The full patent was taken out in November, 1913, and it was adopted by the Air Service. He set up as a consulting engineer in 1919, after resigning his position as Controller of the Technical Department of the Air Board. He had been transferred to this Department on its formation at the beginning of 1917, at first being put in charge of the New Designs Branch. Before that, in February, 1915, he had been given a provisional commission as Squadron Commander in the R.N.A.S. and appointed to take charge of instructional flying at Eastchurch. From March, 1916, to March, 1917, he was in charge of the Aircraft Repair Depôt at Dunkirk, being promoted to Wing-Commander in January of that year.



Flanders Biplane
(See page 81)

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CHAPTER VI

SOME OF THE PIONEERS (II)

Mr. Gordon England's work for aeronautics has been so varied that references to it cannot be confined to one chapter. He got his "ticket" on a Bristol a few days before I did, but my first recollection of him is in connection with his experiments with a Weiss glider at Brooklands in 1910. In the spring of the previous year he left the locomotive works at Doncaster, where he had served as an apprentice, and joined Mr. Pemberton Billing at Fambridge. The late Mr. José Weiss then arrived at Fambridge with his inherently stable monoplane, and within two or three weeks Mr. England, who had helped him in glider experiments at Amberley, joined him, and remained with him up to the autumn of 1910.

From Fambridge he and Weiss went to Littlehampton and tested on the sands the machines fitted with engines; but they found it a most unsatisfactory place, and in the summer of 1910 they moved to Brooklands. Soon afterwards Mr. England bought a Hanriot monoplane, and taught himself to fly.

In the spring of 1911, through the late Graham D. Gilmour, he joined the British and Colonial Aeroplane Company at Bristol and remained with them till the end of 1912, when he became associated with Mr. James Radley at Huntingdon, and produced a seaplane, the first triple-engine machine in the world. It was wrecked by hitting a buoy when alighting. While with the Bristol Company Mr. England had been responsible for many designs, including two which were entered for the Military Trials, and a small two-seater biplane which was eventually sent to Germany as a school machine for a German branch of the Bristol Company.

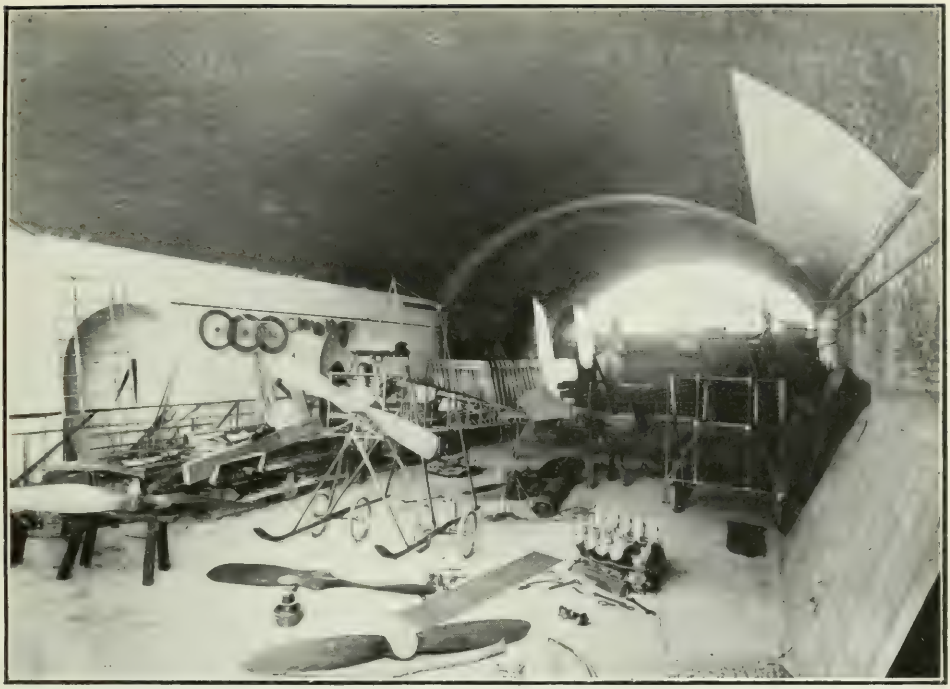
In 1913 Mr. Radley and Mr. Gordon England moved from Huntingdon to Shoreham, and the Cedric Lee, or "circular plane", machine was constructed there under the direction of Mr. G. Tilghman Richards.

In 1911 the late Cedric Lee was co-operating with Mr. Richards in carrying out the experimental development of the "circular plane". This was an attempt to break away from the ordinary type of flying machine, and to build an aeroplane on an entirely new principle. Mr. Richards described it in a paper read before the Aeronautical Society in 1913. The original patent was purchased by Cedric Lee from Mr. G. J. Kitchen, of Lancaster. After trials with model gliders and three man-carrying gliders the Blackburn Company had been approached to build a power-driven machine, but negotiations had fallen through and Mr. Radley undertook the construction. In the end, however, Mr. Gordon England was made works manager and pilot. He flew the machine the very first time it was taken out of the shed, but unfortunately, on returning to the aerodrome the engine stopped and the machine, due to its balance being defective, crashed. It was reconstructed and the defects remedied, and a series of instructive flights were made during 1913 by Mr. Gordon England, Mr. N. S. Percival, and Gordon Bell. It came to grief, however, and a third machine was built which embodied the experience gained, and which proved very satisfactory in flight. This machine was continually flown until the outbreak of the War, when further experimental work was abandoned. Altogether some 1,000 miles, 128 hours' flying, was done on the three Shoreham machines.

Until September, 1915, Mr. England was testing seaplanes for J. S. White and Co., and land machines for Norman Thompson as well.

At the gliding trials at Itford in 1922 he was, I think, the first experimenter who went up, but he had an accident in which he broke an ankle.

The reference to the secret "circular plane" brings me to Mr. Tilghman Richards who, after a period in the drawing offices of Rolls-Royce and Belsize Motors, set up an office in Manchester in 1908, casually came into contact with aviation, joined the Manchester Aero Club, engaged an aviation apprentice, placed his office at the disposal of the Club Committees, gave lectures at the club, and won first prize for scientific model construction at the Manchester Aero Show, 1910. He then found himself in disagreement with the trend of aero research, which insisted upon a big aspect ratio and a high L/D ratio at small angles; to his mind a vicious circle of compromises was thereby set up, precluding progress in aircraft design to the ultimate production of a safe machine. "The very fact of high lift occurring at small angles means the provision of large area for landing speed, resulting in an inefficient altitude of the plane at high speed, and, the inherent instability of curved aerofoils means a continual dependence on extraneous controls carried at



Mr Howard Wright's Works in a Railway Arch at Battersea
(See page 81)

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some distance from the wing by heavy and redundant structure." Again, " high lift at small angles is useless, likewise high L/D at small angles, and what is required is the reversal of the normal type of lift curve, giving little lift at small angles and maximum lift at large angles with low value of L/D for landing." Then, he claims, a machine could be designed with wings just large enough to give the desired landing speed at a high angle, which wings would consequently have a small area, and would fly fast at small angles at a reasonable altitude, and at the lowest point of the drag curve, making the speed range far wider than at present.

Mr. Richards met Cedric Lee late in 1910, and Lee proposed that he should join him as "mechanical engineer" in the development of Kitchen's annular aeroplane; and Mr. Richards closed his office just as it was commencing to pay well.

They moved to Famine Point, Heysham, for trials of Kitchen's biplane. It was unsatisfactory, but they carried on, with little money but much perseverance, until the hangar and machine were wrecked by a gale on 4–5 November, 1911. During this time Mr. Richards was investigating the reactions on the "circular plane", and Kitchen and he had long arguments about principles. After that there was a long period of struggling, handicapped by lack of means.

"There is nothing mysterious about the annular plane," says Mr. Richards; "it affords high lift at large angles, has no burble point, and a good L/D ratio for wings with body. The machine was very fast in flight, for its day, and extremely slow in landing; and there being three distinct regions of lift, one apteroid and two pterygoid on each half wing, the movement of the centre of pressure was a resultant of three distinct regional movements; and with slight modifications could be made to move in any desired manner without affecting the general efficiency of the plane."

After the War Mr. Richards tried to get his idea started again, but without success, until one day Major-General Bagnall-Wild announced that the Air Ministry were prepared to build an experimental machine. But the next week General Bagnall-Wild retired, and the flicker of interest died out again.

In the War Mr. Richards was in the R.N.V.R. attached R.N.A.S., and the last time I saw Cedric Lee, by the way, he was in A.B.'s uniform, and was later killed at Beaumont Hamel. He had joined the Anson Battalion R.N.D., afterwards being commissioned Sub-Lieut. R.N.V.R.

Mr. (now Major) O. T. Gnosspelius, like many another pioneer, was hampered by lack of means, and, indeed, at the beginning of 1914 he had to stop work for that reason. In 1909 he began model work, and for the next few years gave all his time and money to his experiments. He began building a monoplane at Windermere, and having no aerodrome he decided to fit the first machine with floats. He made many experiments, and succeeded in introducing a Ramus-type float, with which the machine attained high speeds over the water and bumped off waves, but failed to lift properly, being underpowered.

His next machine was a larger monoplane of the same general design, fitted with a 40 h.p. Clerget engine. This left the water in the spring of 1912, and was afterwards successfully flown by Mr. Ronald Kemp and Mr. J. Trotter, and was still flying in the spring of 1914. In 1912 Mr. Gnosspelius designed the "Water Hen" for Mr. E. W. Wakefield on the lines of the original "Waterbird" (Roe-Curtiss) bought by him. In 1913 he designed a pusher monoplane for Mr. Wakefield, and this was used for a period by the Northern Aircraft Company. He next designed a large tractor biplane with 100 h.p. Green engine, which flew, but was too heavy for its power. When the War broke out he was given a commission in the R.N.V.R. attached R.N.A.S. and was employed on the inspectional staff. On the formation of the Air Board he was transferred to the Technical Department, where he remained to the end of the War.

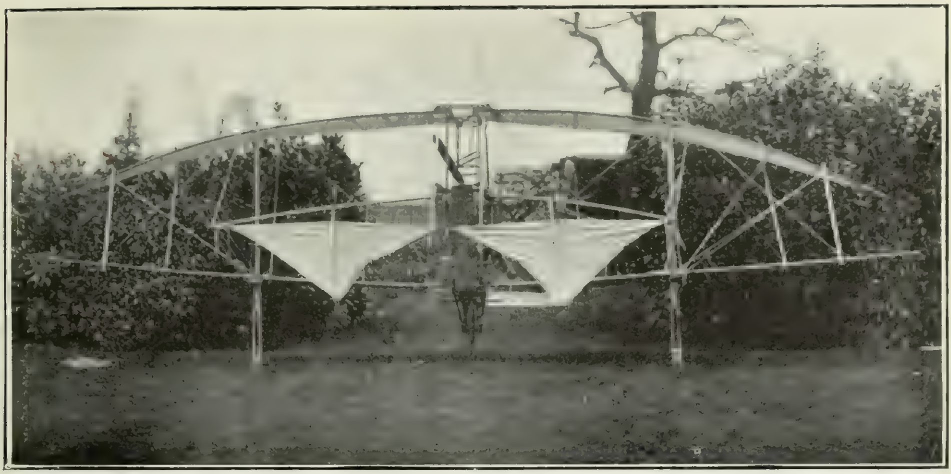
Major Gnosspelius was prominent at the motor-glider meeting at Lympne where he had a twin-propeller monoplane.

His is a singularly ready mind, which refuses to admit we are at the end of discovery in the region of the natural laws on which flight is based. Such men ought to be given facilities to test their theories without hampering supervision.

Now for a brief but important digression from the aeroplane to a life-saving contrivance.

It would be interesting to know the exact number of men who owe their lives to the late Mr. E. R. Calthrop. He was still actively engaged both in connection with the Barsi Light Railway and in improving the parachute when his death, in April, 1927, came as a shock to his many friends. There is not space to deal with his important engineering career here beyond mentioning that after being apprenticed and serving on English railways, in 1882 he obtained positions in India on the Great Indian Peninsula Railway until 1889, when he applied himself to the promotion of 2 feet 6 inch gauge light railways in India as feeders in poor country to the main trunk lines.

It was the death of his friend, the Hon. C. S. Rolls, in 1910, and the escapes while flying of his eldest son, that caused Mr.



F. S. AND R. H. BARNWELL BIPLANE, 1900
(See page 82)

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Calthrop to attempt to improve parachutes. A long course of research and experimental work led to his invention of the "Guardian Angel" aeroplane parachute, the first official trial of which was made by the Admiralty Air Department in October, 1914, at Farnborough. Its automatic opening principle received high commendation, but the weight (90 lbs.) was a drawback. Mr. Calthrop was given a specification to work to, and he redesigned his apparatus, and produced the first "A" type parachute, the weight of which was only 24 lbs., and the length of drop in which it opened between 80 and 100 feet. Trials were made of this parachute in March, 1915, and were entirely successful. In July, 1916, it underwent further trials and received unqualified praise from Lieut-Col. Sir Bryan Leighton, who made the first "live" drops in it at record low heights. By this time Mr. Calthrop, assisted by some of his personal friends, had spent over £12,000 in his research and experimental work.

A factory was taken in Edgware Road, and a private company, E. R. Calthrop's Aerial Patents Ltd., was formed to manufacture parachutes in large quantities, as it was expected the authorities would adopt them. Their use in dropping secret agents behind the German lines, and the example of German pilots owing their lives to parachutes, brought thousands of applications for it from flying officers, but the authorities still refused to supply it as a standard equipment, holding that its very efficiency might cause pilots to desert their machines unnecessarily. Finally, in August, 1918, official resistance collapsed, and orders were given that all aeroplanes were to be fitted with parachutes; but the signing of the Armistice terminated this project.

After the War Mr. Calthrop and the Company spent many thousands of pounds in further experimental work, but, so far as the Royal Air Force is concerned, without success; an American parachute was adopted for the R.A.F. and is still used.

To the post-war generation the name of Mr. G. Holt Thomas is associated with the London–Paris air line, the inauguration of which, on August 25th, 1919, will prove to be, perhaps, the greatest thing he has done for aeronautics, notwithstanding the valuable work his firm did in the War by designing and constructing of the famous D.H. machines. Asked once why he started a London–Paris service, his answer was:

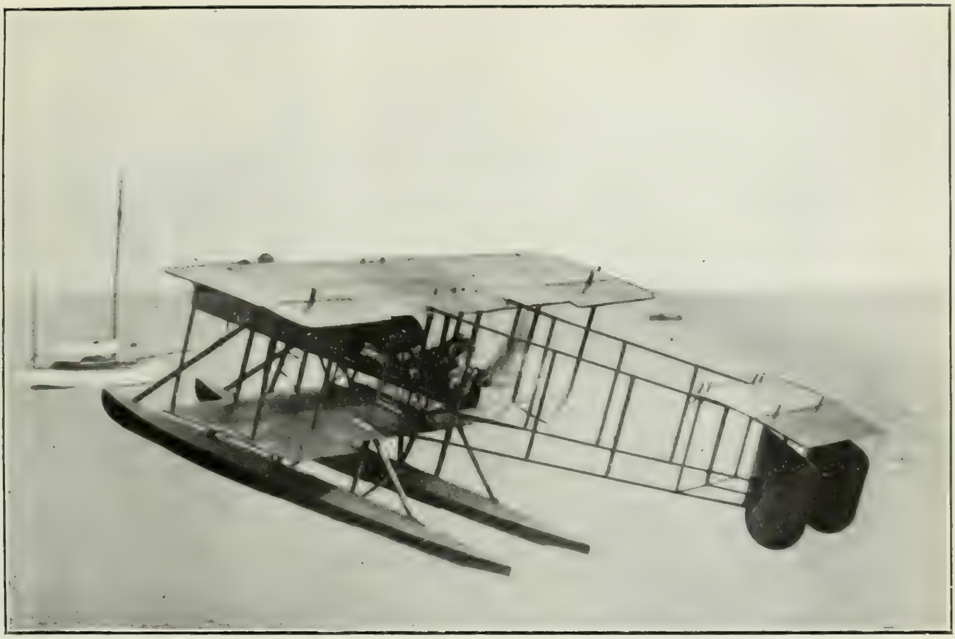
"It is a most difficult route from the point of view of weather; therefore why not begin in some overseas dominion where a settled climate makes flying easy? My answer is that for a demonstration service we want a difficult route. If we can continue to do London-Paris successfully, as we are doing, we prove that flying can be made dependable even in the face of bad weather; and once we have proved this I think most of our troubles will be over."

In 1906, when Santos Dumont was making his first short hops at Bagatelle, Mr. Holt Thomas offered, through the medium of the *Graphic*, which his father founded, a prize of £1,000 for a mile flight. Almost immediately after the Rheims meeting, which he attended, he was asked to help to organise the Blackpool flying meeting. This he did, but while there he decided it was time Londoners saw some flying. M. Louis Paulhan at his invitation accordingly went to Brooklands and gave demonstration flights. Mr. Holt Thomas provided pilot and machine, and the profits were to be divided between him and the Brooklands company. Thousands of people watched M. Paulhan from outside Brooklands without paying a penny, and Mr. Holt Thomas received a cheque for £18, representing his share of the profits in return for the thousands of pounds he had spent! From Brooklands M. Paulhan went to Sandown Park, where he made a height record of 1,150 feet! Not long after that Mr. Holt Thomas organized M. Paulhan's London-Manchester flight. He also arranged the first air-mail experiment at Blackpool.

In the same year, 1910, and also in the following year, he was asked to advise the War Office in an honorary capacity. He had attended the French Army manœuvres in Picardy, and our own manœuvres on Salisbury Plain, and he was able, therefore, to write a report which undoubtedly impressed the authorities. In 1911 he arranged for the building in Great Britain of Farman aeroplanes, and founded the Aircraft Manufacturing Company; and in 1913 he decided to engage his own designing staff, and Captain Geoffrey de Havilland joined the firm. Another important step also was the formation of Airships Ltd. Mr. Holt Thomas has always been alive to the possibilities of the airship for long non-stop flights over land and over sea. The "blimp" type was first designed and developed by him.

The name of Mr. Griffith Brewer has already been mentioned. When the Aero Club was started in 1901 its founder, Mr. F. Hedges Butler, had made only one previous ascent; but at that time Mr. Brewer had made forty. He won the international race from Hurlingham in 1908, when thirty-one balloons started, the largest balloon race ever held in this country.

In a sketch of Mr. Griffith Brewer's career in *Aeronautics*, it is stated that in 1908 he went to France to see the Wright brothers fly, and he was the first Englishman to be taken up by Wilbur



Double-camber Seaplane designed by Mr Howard Wright
(See page 82)

Wright. In the following year, while motoring in France with the Hon. C. S. Rolls, he again met the Wright brothers, and he then cabled for Mr. Eustace Short and the late Horace Short to come over. They went, and received a commission to build six Wright biplanes for the famous brothers. From that time Mr. Brewer was in close association with the Wrights, whose interests he looked after on this side of the Atlantic. Wilbur died in 1912 from typhoid, and Orville entrusted Mr. Brewer with the formation of the British Wright Company.

"The British company might have made legal trouble over patents, but they decided to leave the trade alone and to be content to exact recognition from the Government. No British manufacturer was called upon to pay royalties under the Wright patents, and none was ever refused a license. This history of aeronautical patents litigation in other countries shows clearly that the British industry owed much to its freedom in this respect."

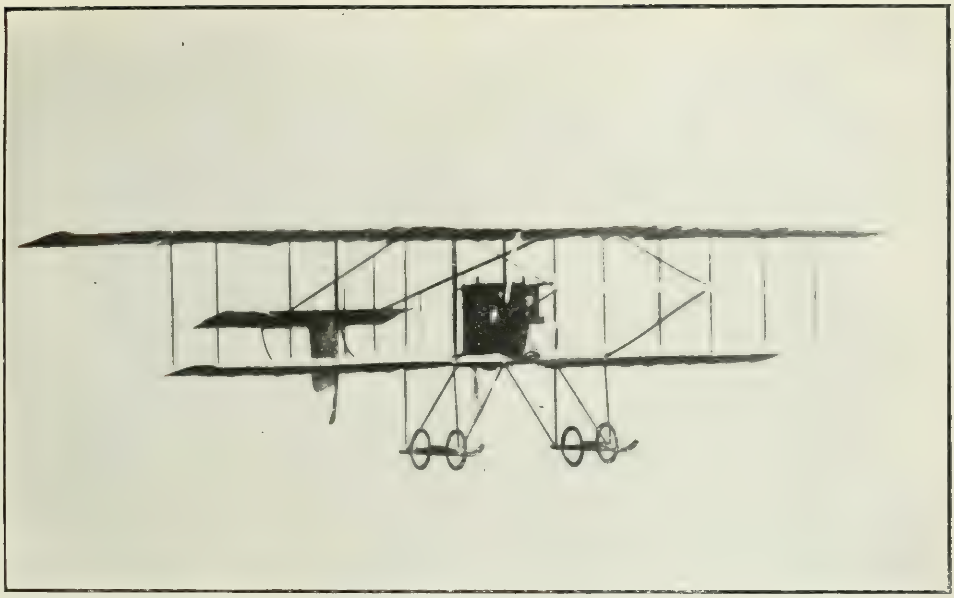
Mr. Brewer was a member of the Aero Club Committee for many years, and was one of the Club delegates to the International Federation. He went over to America during the War, and took his flying "ticket" at Dayton, at the Wright flying school. He has been the hon. secretary of the Wilbur Wright Memorial Fund since its foundation, and in 1916 he delivered the Wright Memorial Lecture. He was for many years a member of the Committee of the Royal Aeronautical Society, of which society he is a Fellow. In 1915 he joined the instructional staff of the Kite Balloon School at Roehampton, succeeding me as a lecturer to officers in training for airships and kite balloons; and, incidentally, he made several ascents in kite balloons freed from their cable, and experimented with a safety ripping device, his own invention. He was appointed chairman of the committee of the Airships' Club formed early in 1926, and is also a member of the Aero Club Committee.

Mr. (now Wing-Commander) T. O'B. Hubbard, M.C., A.F.C., has already been referred to in connection with the London Balloon Company of Territorials and learning to fly on the machines lent by Sir Francis McClean before the Government announced its disapproval of the Territorials learning to fly. He finished his flying lessons and got his certificate, No. 222., on May 17th, 1912, on a Howard-Wright biplane at Hendon. His Territorial duties were recreation after his office work for the Royal Aeronautical Society. Here I borrow freely from the biography I wrote in *Aeronautics*.

Wing-Commander Hubbard lost most of his worldly goods in the San Franciscan earthquake in 1906. Up to that time he had done a lot of wandering in California and Canada and other places, and, incidentally, his wide knowledge of affairs has been of great use in the Service. It was after his return to England, shortly after the earthquake, that he began his work for British aviation, and he has had as much to do with the nursing of the still infant science as any man. He had always shown an inclination for literature, even in his school days at Tonbridge, and his first connection with aeronautics was as joint editor of *Ballooning and Aeronautics*. But the magazine lasted only a few months, and he became assistant-secretary to the Aeronautical Society, afterwards being appointed secretary, librarian, and joint editor of the *Aeronautical Journal*.

The Society was then imprisoned in a small office in Victoria Street, and presiding over the deliberations of the pioneers was "Claude", a stuffed Condor with outstretched wings. "Claude" still decorates the premises of the Society, now in Albemarle Street. The work of the Society took up nearly all Mr. Hubbard's time, and his pay was, I believe, about 15 shillings a week. The *Aeronautical Classics*, published by the Society, were in part the result of his initiative and labour. He became one of the leading authorities on aeronautical history and literature, and acquired a valuable library, which, with characteristic generosity, he presented to the Society on resigning from the secretaryship in 1912. With Mr. J. Ledeboer and myself he produced *The Aeroplane, an Elementary Textbook*, and was responsible also for part of the translation of Duchêne's valuable works. He wrote *The Boy's Book of Aeroplanes*; and the literary merit of his *Essays of an Aviator* caused much speculation as to the authorship. He became a second Lieutenant on probation in the Royal Flying Corps in August, 1912, and when the War broke out became Flight Commander with temporary rank of Captain, and was appointed to the Central School of Flying at Upavon as an instructor.

The late S. F. Cody was an American who became a British subject during the Doncaster Flying Meeting. He was an extraordinarily daring and original character, in turn cowboy, actor, kite-inventor, balloonist, and aviator. He came to England at the age of thirty-four as a "Wild West" showman, but a few years later the public tired of this sort of show, and Cody became an actor-author of a melodrama in which all his family took parts. While touring the provinces he became interested in kite-flying, and conceived the idea of producing a man-lifting kite for military purposes; and he was so successful with his design and in the skill he displayed in handling it that he convinced the Army authorities of its practicability.



Mr T. O. M. Sopwith in the
Howard Wright Biplane, Philadelphia, 1911
(See page 83)

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Melodrama was thereafter abandoned, and "Colonel" Cody became an Army instructor at Aldershot, teaching kite-flying to the British Tommy. He tried to use his kite to draw boats, and went so far as to attempt a crossing of the Channel by that method! After much inexcusable delay and under pressure of a public agitation on Cody's behalf the War Office eventually awarded him £5,000 for his kite.

The military airship next engaged his attention. He returned to Farnborough, and, in conjunction with Colonel Capper, produced, in 1907, the "Nulli Secundus", the first airship possessed by the British Army. As already related, this airship came down in the Crystal Palace grounds, and it was then that I first met Cody, for I was waiting there for a good wind for an attempt to set up a ballooning distance record in which I took part. Cody, by the way, for some mysterious reason, soon decided to address me as "Uncle", although I was junior to him.

The design of an aeroplane was Cody's next ambition, and after many disappointments and mishaps he succeeded in September, 1909, in flying a distance of eighty yards at Farnborough on the same machine on which, altered, reconstructed, and renovated from time to time by himself and his two sons, he won, in 1912, the year before his death, the War Office prize of £5,000, and afterwards sold it to the Government for £2,000. To the shame of certain newspapers they ridiculed Cody's early efforts, besides expressing scepticism as to the use of aeronautical experiments of any kind. The "Cathedral", as his machine was known, was a big biplane of 46½ feet span, with an 8 feet gap between the planes. Its weight was 1,300 lbs., and it was by far the largest and heaviest flying machine of its day. Its first motor was a 60 h.p. E.N.V., but it was successively fitted with a 50 h.p. Green, a 100 h.p. Austro-Daimler, and, later still, a 60 h.p. Green. On this machine Cody, until it was acquired by the War Office, took part in many leading events in English aviation, including the Doncaster meeting, 1909, and the Circuit of Britain in 1911.

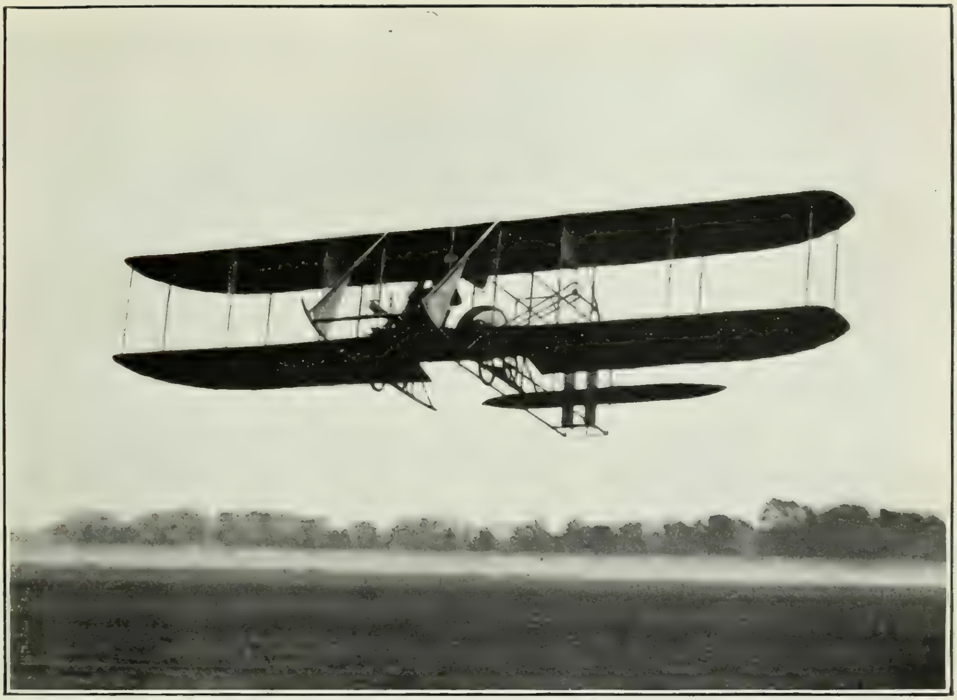
In 1909 his longest flight was a distance of about forty miles, covered in a little over an hour. In 1910 he won the British Empire Michelin Trophy with a flight of 185½ miles in 4 hours 47 minutes. In 1911 he again won the British Empire Michelin Trophy, with a flight of 261½ miles, also the British Empire Cup, and competed in the Circuit of Britain contest, but had to retire in the second stage. In 1912, in addition to winning War Office prizes amounting to £5,000, taking first honours in both the British and the International division, he again won the British Empire Michelin Trophy with a cross-country flight of 186 miles, and was awarded the Royal Aero Club's gold medal—a rare distinction.

In the following year he met his death, flying a new biplane in which he had intended to compete in the Circuit of Britain Seaplane contest. He had completed its trials, and it was in a flight over Bramshot, with Mr. W. H. B. Evans as passenger, that the fatal accident occurred, both being killed.

Mr. C. R. Fairey, whose name is familiar through the series of aeroplanes named after him, is a big man both in stature and ideas. His faith in aviation is firm, but he has never belittled the difficulties. Indeed, the inveterate optimist, who refuses to see difficulties, would probably dub him a pessimist. Mr. Fairey has from the earliest days been convinced that speed-range is the great problem to be tackled, and that until this is satisfactorily solved aviation will be severely hampered.

He is a forceful personality, and can always be relied on for a speech at a debate or dinner. He had his first training at the Finsbury Technical College, and was for a time lecturer on mathematics and engineering at Tottenham Polytechnic, and other places. He had always been interested in flying, and in his schooldays had built models, but it was not until 1910 that he was induced to enter one for public competition at a meeting of the Kite and Model Aeroplane Association, at which it won every event. This model involved an infringement of an early patent of Mr. J. W. Dunne, and this circumstance brought the two men into contact, with the result that in 1912 Mr. Fairey became manager to the Blair-Atholl Syndicate, manufacturing the Dunne machine. It was on this machine that Mr. Fairey first tackled the practical problem of stressing an aeroplane, and in conjunction with Mr. Harris Booth, who later went to the Admiralty, he established at Eastchurch quite a number of what are now common principles in stressing.

On leaving the Blair-Atholl Syndicate Mr. Fairey went to Short Bros., and was with them until June, 1915, when the Fairey Aviation Company was formed, and it was then that he began seriously to tackle the problem of speed-range and the reduction of the huge wing areas necessary at that time. The "Campania" seaplane, a two-seater fighter, with high-lift wings, was produced; but Mr. Fairey was not satisfied, and he started afresh with his variable camber wing, the first machine with this wing being produced in June, 1916. It was not entirely successful, but experiments were continued until success was reached, and many types have now been produced with such wings, and hundreds of machines supplied to the Services.



Burgess Wright Biplane at Brooklands, Mr Sopwith piloting
(See page 84)

Some of the Pioneers

A family of aeronauts which takes us back a century is that of the Spencers. About 1830 Edward Spencer, a solicitor of Barnsbury, made balloon trips and was an associate of Charles Green, the aeronaut of the famous "Nassau" balloon. He was one of the crew of the balloon which took up the ill-fated Cocking and his parachute. His son's name appears as the inventor of a flying machine in 1868, and his grandsons became the well-known ballooning firm, Percival, Stanley and Arthur, one or another of whom visited most countries, even to China and Japan, and gave ballooning demonstrations and advised War Offices. The children of the Spencer family begin aeronautical work very early in life, and it is customary to give them parachute descents when they are from six to eight years of age.

Auguste Gaudron, who was my first instructor in ballooning, a Frenchman domiciled in England, joined up with the Spencers in his youth, and married a sister of the three brothers. A son of Percival Spencer was in the balloon service at Roehampton during the War.

For a dozen years one of the most prominent personalities in aviation was Mr. Claude Grahame-White. He was, indeed, a popular hero until the War, when he became engaged in aeroplane manufacture on a larger scale. His brilliant early flying exploits, and a way he had of dilating on the enormous possibilities of flying, caught the imagination of the public.

It was M. Blériot's cross-Channel flight in July, 1909, that turned Mr. Grahame-White's attention to practical flying. He at once went to France to buy an aeroplane, and at the Rheims meeting he made a deal with M. Blériot. At the conclusion of the meeting he was to acquire a monoplane two-seater, of 60 h.p., on which M. Blériot intended to compete in the first Gordon Bennett race. The machine, however, caught fire in the air—an accident which nearly cost Blériot his life.

But this accident proved a blessing in disguise for the future proprietor of Hendon aerodrome. M. Blériot undertook to build another machine, and he granted Mr. Grahame-White what was, at that time, a unique privilege—permission to assist in the erection of his future machine at the Blériot factory. Here Mr. Grahame-White gained much valuable experience, and the monoplane was completed in November, 1909. He made trial flights at Issy-les-Moulineaux, accomplishing several "straights" after less than half an hour's practice in handling the controls on the ground. It is noteworthy that the landings were successful, despite the fact that the aeroplane flew at between fifty and sixty miles per hour—having an unusually powerful engine—and that considerable skill was needed in alighting.

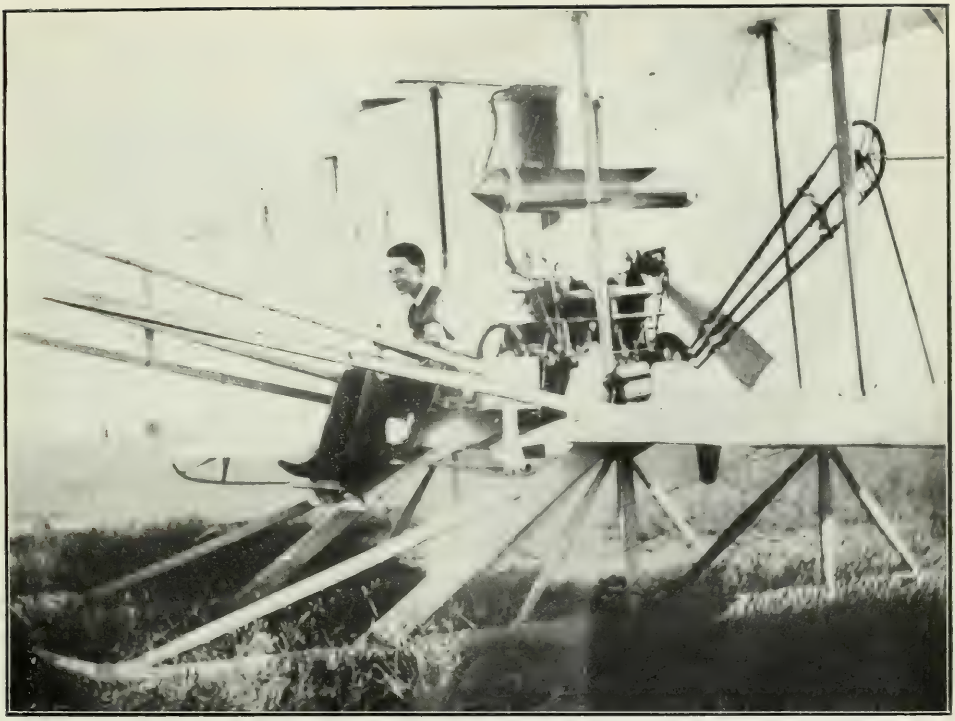
The aerodrome at Pau was the next scene of Mr. Grahame-White's activities, M. Blériot suggesting the change on account of the larger ground and better atmospheric conditions. It was at Pau where the French Aero Club granted Mr. Grahame-While his pilot's certificate, in December 1909. At the British flying school, which he formed at Pau, Mr. Grahame-White included among his pupils Mr. Lionel Mander, M. Charles Hubert, Mr. Armstrong Drexel (an American who subsequently established an altitude record), and Miss Spencer Kavanagh.

He shared the risks common to those who ventured to fly in the early days. Gliding against the wind with engine cut off on one occasion he stalled and dived, hitting the ground almost vertically. He still bears traces of the cuts on his face, and he was fortunate to escape without more severe injuries. On another occasion he side-slipped when practising banking, and his machine was wrecked in a stream, the pilot unscathed. When attempting a flight round Pau his engine failed at a very unfortunate moment—in view of the crowded streets below!—but, more by luck than skill, he says, he succeeded in reaching the garden at the back of a house.

Mr. Grahame-White's performance in the London-Manchester flight contest for the £10,000 prize in April, 1910, is described elsewhere.

The year 1910 brought him many successes at British meetings. For the largest aggregate of points at Wolverhampton he gained the first prize of £1,000; at the Bournemouth meeting he made a continuous flight of over 90 miles in a little less than three hours, and accordingly won the trophy for the longest flight. It is interesting to recall, too, that at the Blackpool gathering Mr. Grahame-White demonstrated the feasibility of aerial mail and military despatch-carrying.

At the American meetings in 1910 he also did well. He came in first, on aggregate points, at the Harvard-Boston show, while another trophy fell to him for flying the thirty-three miles round the Boston Light in 34 minutes. Displays at Brockton, Mass., (in a rain and wind storm) and at Bennings, near Washington, made him a favourite with the American public. From Bennings he made a flight into Washington and landed in Executive Avenue. He left his machine in the thoroughfare while he called on President Taft at White House, and subsequently "took-off" again successfully. At Boston he won £6,420. He also won for Britain the second International Speed Race for the Gordon Bennett Trophy at New York.



Mr (now Sir) F. McClean on Short No. 1
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The competitors included Aubrun, Latham, Brookins and Leblanc. Mr. Grahame-White flew a 100 h.p. Blériot monoplane, and covered the 100 kms. at just over 60 m.p.h. He also took a prize for a flight round the Statue of Liberty. For his success, from the national point of view, in the Gordon Bennett contest, he received the gold medals of the Royal Aero Club of Great Britain and of the Aerial League of the British Empire, and the latter was presented to him by the late Earl Roberts.

In the course of his second American tour in August, 1911, he won the principal prizes at the Boston meeting with a 70 h.p. Nieuport monoplane, and was among the successful flyers at a New York meeting.

On the outbreak of the War he placed his services at the Government's disposal and received a commission as Flight-Commander in the R.N.A.S. He gave advisory assistance in the aerial defence of London, and carried out some of the earliest night-patrol flights, principally in a Henry Farman biplane. In February, 1915, he took part in the first of the air raids on the German bases along the Belgian coast. He flew an 80 h.p. Farman biplane and, after crossing the Channel, was compelled by engine failure to make a forced landing in the sea, when some four miles off Nieuport. He was picked up by a French minesweeper and transferred to a British gunboat.

CHAPTER VII

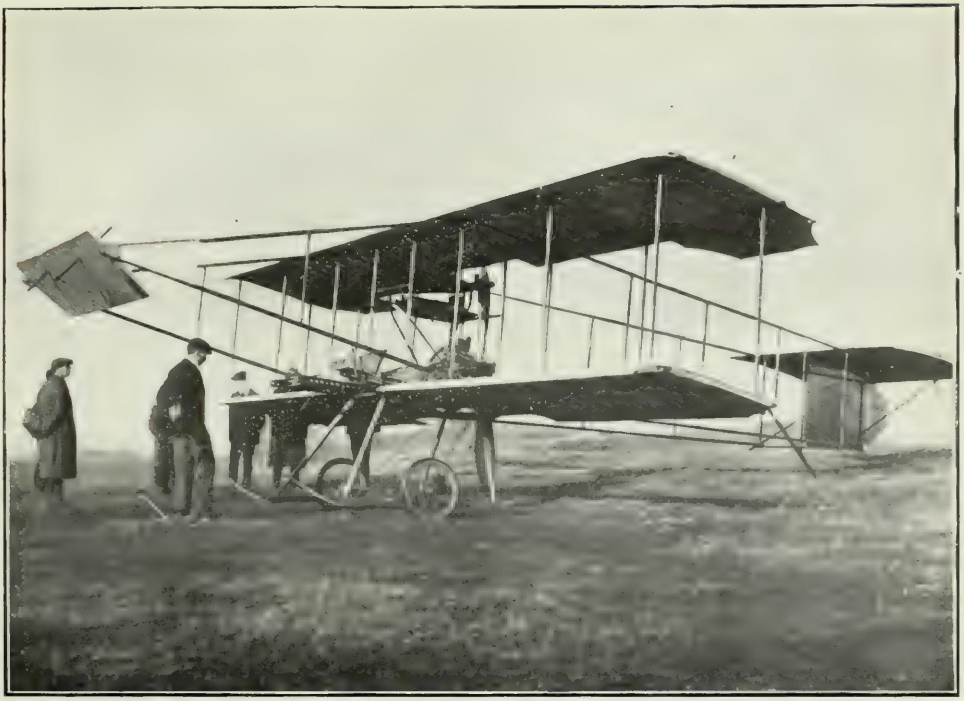
FIRST BRITISH FLYING MEETINGS

In order to understand the position in aviation history of the flying meetings at Doncaster and Blackpool it is necessary to recall the events immediately preceding them.

In the late summer of 1909 the remarkable achievements at the great aviation meeting at Rheims did more to arouse public interest in flying than Louis Blériot's single, daring, cross-Channel flight. All said and done, that was a one-man show; it might mean much or it might mean little. The steady piling up of mileage and other records at Rheims, and the growing length of the list of flights exceeding one hour's duration, gave additional importance to Blériot's great feat, for they proved it really was epoch-making. At Rheims assembled all the new world of aviation, and the greatest enthusiasm was displayed. There was at least one day when each ascent of an aeroplane was hailed by the popping of champagne corks. Alas, I did not go to Rheims.

The rival American and French schools of design were represented, the first by the Wright biplane with its two pusher air-screws driven by one engine, and the other by the pusher biplanes fitted with tails, (in which respect they offered a fundamental contrast to the American Wright machine), and by the French tractor monoplanes (Blériots and Antoinettes). I had almost forgotten to mention the American Curtiss, a machine with stabilising surfaces in front of and behind the main planes; yet it was with this machine that Mr. Glenn Curtiss won the Gordon Bennett at Rheims at the inauguration of this annual contest, the course for which that year was only 12.4 miles.

In order to see the British flying meetings in true perspective it is necessary to summarise the achievements at Rheims. There was, for example, a struggle for world records, the American tailless Wright biplane holding the distance and duration best one day, and the French tailed Voisin wresting both records from it within 24 hours. And how eagerly were the "lessons" of the meeting explained! On the strength of the Curtiss



Farnborough 1911 (De Havilland Biplane)
(See page 85)

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victory in the Gordon Bennett, it was claimed that, after all, the French "school", which attached so much importance to a big tail, could not be altogether correct, for the Curtiss tail was a mere apology for one. Nowadays sweeping judgments are less incautiously formed.

At that meeting there were more than thirty aviators, and the only British competitor was Mr. G. B. Cockburn. There were more than a hundred flights, eighty-seven of them exceeding three miles. Seven flights exceeded one hour; three of these exceeded two hours, and one exceeded three hours. The prizes amounted to a total of £8,000. Here is a list of the competitors:

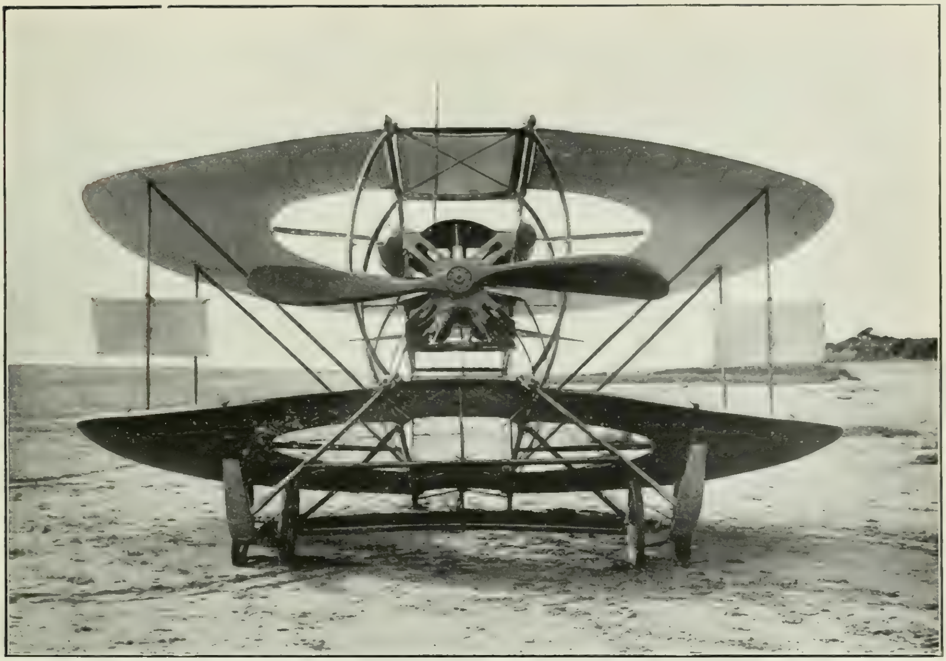
Competitors.		Machines.
J. Gobron	1	Voisin biplane
"F. de Rue"	1	,, ,,
L. Paulhan	1	,, ,,
E. Bunau-Varilla	1	,, ,,
H. Rougier	1	,, ,,
G. Voisin	1	,, ,,
A. Fournier	1	,, ,,
G. Legagneaux	1	,, ,,
P. Tissandier	2	Wright biplanes
Comte de Lambert	2	,, ,,
Société Ariel	2	,, ,,
L. Blériot	3	Blériot monoplanes
L. Delagrange	1	,, ,,
A. Leblanc	1	,, ,,
H. Farman	2	Farman biplanes
G. B. Cockburn	1	,, ,,
R. Sommer	1	,, ,,
R. Esnault-Pelterie	3	R.E.P. monoplanes
M. Guffroy	1	
H. Latham	1	Antoinette monoplane
R. Demanest	1	,, ,,
Ruchonnet	1	,, ,,
Glenn H. Curtiss	2	Curtiss biplanes
Santos Dumont	1	Monoplane
L. Bréguet	1	Bréguet biplane
Sanchez-Besa	1	Sanches
Kluytmans	1	,, ,,
G. Bailly	1	,, ,,
L. Schreck	1	Wright biplane
Fernandez	1	,, ,,
P. Roger	1	,, ,,

"F. de Rue" was the name under which Captain Ferber flew. He was killed shortly after this meeting at Boulogne, his machine turning over at a ditch. Captain Ferber was a scientist whose loss to aviation and to France was a severe one. He had already made important contributions to the study of aerodynamics. He was one of the founders of the Ligue Nationale Aérienne, and was experimenting with gliders even before the Brothers Wright. In 1906 he was commissioned by the French Government on a secret mission to the Brothers Wright at Dayton.

The total receipts at the Rheims meeting were £30,000. Post Office receipts exceeded £10,000, and more than one million words were telegraphed for the Press.

The Doncaster meeting took place on October 15-23, and the Blackpool meeting on October 18-23. The Doncaster meeting therefore was the first flying meeting in this country, and this, despite the fact that the Aero Club not only refused to recognise it, but actually banned it. The point at issue was this: The Fédération Aéronautique Internationale was, and is, represented in each country by a governing authority affiliated with it, and in this country that authority was, and is, the Royal Aero Club. But at the time of the Doncaster meeting a number of new aeronautical bodies had sprung up, and these were not connected with the Aero Club. The Aero Club had not been at all anxious to have a flying meeting in 1909, and had some reason to believe that a better start could be made in 1910. The Doncaster meeting was organised by a Committee which had nothing to do with the Aero Club, and the Club, as the authority responsible for the conduct of flying as a sport, was opposed to such a challenge to its status.

I remember being with some of the competitors on the night before the opening of the meeting, when they all received from the Aero Club a telegram warning them that if they took part in the meeting they would be banned by the International Federation from any future meeting held under its auspices. M. Sommer glanced at his telegram and threw it down with a smile and a shrug of the shoulders. Cody became furious. None of them submitted; and even Cody, to whom the ban would have meant disqualification for participation in the London-Manchester contest for a prize of £10,000 for which he meant to enter, risked it. The Aero Club "suspended" him for three months, but at the end of six weeks re-instated him. As a matter of fact, a considerable section of the Press was opposed to the Aero Club on the ground that at such a time it would have been better to be content with a mere statement of its position; and the Comte de la Vaulx, a vice-President of the French Aero Club, strongly criticised the Aero Club. By this time, of course, the aviators who were to appear at Doncaster had signed agreements, and were thus placed in a difficult position. They could not have been expected to take into account the fact that the position of the Aero Club had been in effect challenged by rival organisations which had been



MR. G. TILGHMAN RICHARDS'S
"ANNULAR" WING MACHINE, 1911
(See page 88)

lately formed in England. *Punch* came out with a playful skit on the subject. But, of course, when aviation began to settle down an authority possessing experience was absolutely necessary. On the whole, the Club has worthily fulfilled its responsibilities, not too easy a task at times, and often the occasion for criticism. To-day, the Aero Club holds an unchallenged position.

The arrangements at Doncaster were excellent. The aerodrome was the racecourse, and there was a great advantage in having at the service of the meeting the organisation which had grown up and been developed for quite a different sport. The programme contained a code of fifty-eight signals, flags indicating each competitor and the nature of the competition or test on which he was engaged. Nowadays, of course, the wireless telephone and loud-speaker perform this service far more effectually.

The competitors at Doncaster were S. F. Cody on the Cody biplane, Roger Sommer on a Farman biplane, Hubert Le Blon, Count John van der Burch, Léon Delagrange, L. Molon, and M. Prévost on Blériot monoplanes, Captain W. G. Windham on his own machine fitted with a J.A.P. engine and a queer propeller with blades like huge half moons, Saulnier on the Chauvière monoplane, Mr. Edward Mines on his Mines biplane and Colonel Schreck on a Wright biplane. There were prizes for speed, duration, height, distance, taking-off, passenger-carrying, and cross-country flying.

One of the curiosities of the meeting was the Mines biplane, promptly nicknamed the "coffee-stall". Its planes had a span of only fourteen feet and a chord of six feet. There was no tail, and the ruddering was by means of square flaps fitted between the wings. This machine had an elevator in front of the top plane, and the bottom plane's extremities were adjustable. Needless to say, it never flew.

Another remarkable type was the Chauvière, a "parasol" monoplane with a reefable wing for speed-variation. The wing was made of a brown, canvas-like fabric. There were two pusher propellers. This machine also was a non-flyer, but I believe it was bought by a local gentleman and placed in his private museum. From the point of view of beautiful workmanship, the Chauvière monoplane was certainly notable. The Windham machine collapsed without ever flying.

An interesting machine which put in an appearance at Doncaster was a Voisin type fitted with a gyroscopic automatic stability control. It was taxied about by Captain E. M. Maitland, but no flights were made on it.

Léon Delagrange had a Gnome motor fitted to his Blériot, and thus for the first time in this country we saw this interesting and remarkable engine, which did so much for flying, despite its exploitation of a principle which has now been abandoned. I remember Delagrange on one occasion flying close over my head with this machine, when he attained a speed of 50 m.p.h., quite remarkable in those days.

There was a great gathering of national and county celebrities at the Doncaster meeting. I met Lord Roberts there, and also Lieut-General Baden Powell, whose brother, Major B. Baden Powell, was one of the pioneers of aeronautics.

At this meeting I also met Mr. (now Sir) Theodore Cook, who had recently been appointed editor of the *Field*. He had much to do with the meeting, besides describing it for the *Daily Telegraph*. Sir Theodore's services in many fields of sport are of national and international importance. In his delightful book, *The Sunlit Hours*, he makes many references to flying. One is quoted here:

"In September, 1909, it happened that I stood with the Empress Eugenie, Countess Metternich and General Sir Horace Smith-Dorrien, while they inspected S. F. Cody and his machine at Aldershot. At half past two that afternoon Cody was hard at work on some detail that needed repairing or strengthening in his cylinders, and he informed me that at six he would be ready for an attempt. The day was far from perfect, and a fairly strong wind had been blowing over the Bramshott Links, where a golf competition was in progress; but by six o'clock the evening was as perfect as anyone could have desired, with scarcely a breath of breeze. At five minutes past six the machine was carefully brought, sideways, from its shed. Those who have had any experience of the Rheims flying meeting, the first of its kind in the world, must have been aghast at the liberty permitted to the large crowd of spectators, which numbered over a thousand before six, and double that total in an hour's time. They swarmed round the doors of the shed; they stood in serried ranks round the machine itself; they came in motor cars, in gigs, in landaus; and their bicycles were as the grasshopper in his strength. With any less skilful aviator than Cody, there would undoubtedly have been a serious accident. He preferred to run the risk of breaking his aeroplane; and he very nearly did in getting out of the way of people who should never have impeded him." Sir Theodore then, and at Doncaster, observed the difference between Cody's turnings and those of the other competitors. The latter took wide turns. Cody made straight for his mark, and no sooner was he seen to reach it than he seemed on his way back again!

S. F. Cody on his Biplan

Flight pho

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Cody was the hero of the Doncaster meeting, for many reasons. His was the one all-British machine, and he had just come from the accomplishment of a noteworthy cross-country flight, forty-seven miles in sixty-three minutes. As ever, he was battling against difficulties and overcoming them. None who were present will ever forget the occasion when, after a ground accident, which left his machine with its big tail and remarkable tail skid sticking up out of reach, he procured a rope, made a lasso, and with the dexterity of a Wild West showman (he was not the original Buffalo Bill, by the way) lassoed that skid, secured it, and righted the aeroplane!

The first day of the meeting was wet and windy, and although machines were brought out none of them flew, with the possible exception of the Cody, which taxied and, it was said, just cleared the ground for a few feet. But on the following day there was flying, and I had the reward of virtue by getting up very early in the morning and going out to the racecourse and seeing Le Blon do a trial flight. He flew no less than 200 yards! In the afternoon Cody created a sensation by starting up his engine in the shed and driving out of it, and without stopping mounting into the air. It was soon after this that he turned up on his nose when taxying over a bad path on the far side of the field; and the moment he was seen to do this Delagrange got into his machine and flew to the spot to render aid if necessary. It is difficult to convey to the reader the tremendous interest and excitement caused by such doings at a time when the mere spectacle of a flying machine was novel and, generally speaking, the public were unconvinced that flying was possible.

Bad weather interrupted flying on most days, but it also enabled impressive flights to be made in rain, and in winds up to twenty miles per hour, and on one occasion R. Sommer flew until dusk and moonlight and when the aerodrome was lit up. As the week wore on other aviators arrived, among them Captain J. G. Lovelace with a Blériot on which he made a few short hops, on one occasion starting the propeller himself and, just as the machine began to move forward, running round behind the wing and leaping into the pilot's seat.

October 23rd brought a stirring incident. M. Le Blon, apparently caught in an eddy of wind, swept towards the rails and the crowds, and was seen to fall among them. It looked like a great disaster, for the machine rushing down at a dense mass of people with its whirling propeller and its tank of petrol would deal death unsparingly. We hurried to the spot, and were amazed to hear the cry "All right!" We saw the wrecked machine and Le Blon standing by it explaining matters to Delagrange.

"He came straight at us," said one of the crowd. "Then he leaped up over our heads, and we thought he would fly into the trees. We saw his face: he looked cool enough as he waved us out of the way. And then he fell!"

Le Blon afterwards said to me: "I had to face the wind to save myself; and there was the crowd, and there was not time to descend in front of the rails. But there was a space between the crowd and the trees if the people would give me room. I waved to them, flew over them, and then came down flat just in time."

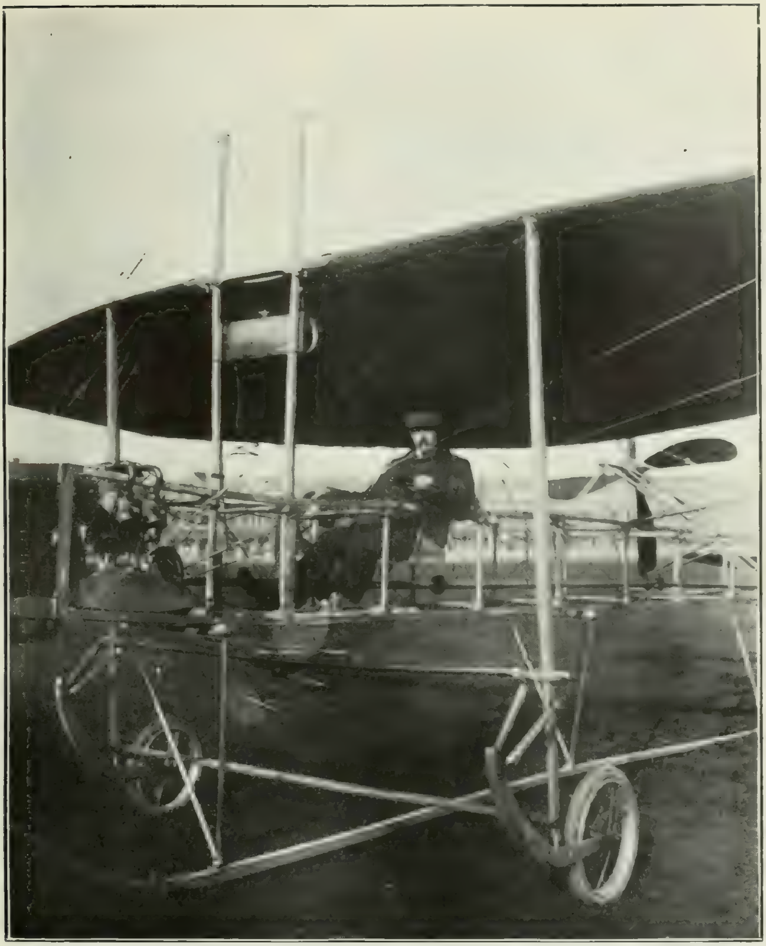
Le Blon was carried shoulder-high, for all realised not only the danger he had escaped, but his thought for the safety of the crowd. I remember vividly how when he was seen to fall the band stopped playing, and the conductor, after a few seconds' pause, rallied his orchestra, which, after one or two muddled bars, got into their swing again.

There was a great deal of flying all that day, and Mr. A. E. George, one of the Shellbeach airmen, tried to fly Captain Maitland's machine, but could not get it up. The last day of the meeting, which had been extended for two days, was held in foggy weather, which, however, did not altogether prevent flying.

The total distance flown during that meeting was 226 miles, but this of course does not include trial flights. Delagrange won the speed prize with a speed of less than 45 m.p.h., but he did the fastest circuit, about a mile a minute.

I must include in these notes, a picturesque incident at Doncaster, nothing less than the naturalisation of Cody as a British citizen, on October 21st, 1909. The Town Clerk of Doncaster brought the document for him to sign, and to do this easily Cody laid it on the solicitor's back. Then, while the oath was taken, the ring of onlookers, officials and aviators uncovered. Cody took off his hat and repeated: "I, Samuel Franklin Cody, do swear that I will be faithful and bear true allegiance to his Majesty the King and his heirs and successors according to law."

Cheers were raised; the band played the National Anthem; then there were three more cheers. Fifty cameras recorded the scene. The heroic Cody was a British citizen. He had exchanged his old protecting flag, the Stars and Stripes, flying from the left top of his hangar, for the Union Jack, streaming bravely from the right. He promptly entered for the £1,000 prize offered by the *Daily Mail* for the first British aviator who on an all-British aeroplane flew a circular course of one mile. Cody's biplane was all-British with the exception of the motor. He immediately sent for a British engine.



The Chauvière Monoplane. Doncaster, 1909
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Of the Doncaster pilots, we were ere long to lose two. Léon Delagrange, who was one of the most delightful men I have met in aviation, a sculptor, a scientist, and a pilot—remarkable combination!—was killed at Bordeaux while flying in the presence of a large crowd. His Blériot monoplane broke in the air, and he fell from about forty feet, fracturing his skull. A theory was then put forward that the Gnome motor subjected the machine to excessive strains because of the resistance it made to turning movements, and Delagrange himself had remarked on the curious difficulty he had in managing the machine with this rotating motor. This theory was not confirmed by scientific inquiry, and there is little doubt that the mere increase of power beyond that for which the machine had been designed would account for the collapse. In fact, aeroplanes of those days were all structurally unsound.

Le Blon, who shared with Delagrange and Cody the larger share of the affections of the crowd at Doncaster, was soon afterwards killed, at San Sebastian.

The Blackpool meeting suffered as much from bad weather as did the rival show at Doncaster. Like the latter, it depended chiefly on foreign pilots and machines. Blackpool piled up a slightly greater air mileage than Doncaster, but there were fewer pilots at work. The money prizes were bigger at Blackpool, but the Doncaster aviators received large fees for attending and flying.

One of the competitors at Blackpool was Mr. A. V. Roe, who tried to use his famous triplane, for whose first 9 h.p. J.A.P engine he had substituted a 24 h.p. Antoinette. Unfortunately, the engine was very sulky, and Roe was able to do no more than a few hops. His friends dubbed his craft "The Yellow Peril," from the colour of the wings.

The event which gave the Blackpool meeting distinction was the late Hubert Latham's flight in a high wind. The public had been getting a little restive under the disappointment due to bad weather, and one evening Latham told a friend that he would go up the next day no matter what the conditions might be. The following morning brought storm, and all the machines remained in their sheds, except Latham's Antoinette, which, to the amazement of everybody, was brought out to the starting line. Friends went up to the pilot and attempted to dissuade him, for not only was the wind strong, it was very gusty, and at that time no aviator had ever attempted to fly in such conditions. To-day they would not be regarded as impossible, although getting off and landing in a gusty wind is never easy.

Once in the air, of course, and especially if the wind is not gusty, it does not matter what its velocity is except from the point of view of preventing an aircraft making headway against it to a desired destination. One has seen a slow aeroplane actually moving backwards, the speed of the head wind being greater than the independent speed of the machine.

With some difficulty Latham got off, narrowly escaping misfortune; and the spectators then breathlessly watched a man battling with the elements. The aeroplane swayed and tossed in the most alarming manner. Its speed down-wind was computed at ninety miles per hour, whilst up-wind, it appeared at times to be motionless. Every second during an age-long ten minutes the people expected disaster, and when at last Latham landed some of the Frenchmen were actually in tears, so overwrought were their feelings. It was officially stated that the gusts were at times forty miles per hour.

The final results of both meetings were as follows:

BLACKPOOL

For the Slowest Circuit (about two miles)—First; Latham, 5 min. 30 sec.; speed, 21⅔ miles per hour. Cup and £100 presented by the *Manchester Guardian*.

Prizes for General Merit of £300, £150, and £50, for the three competitors who in the opinion of the stewards of the meeting had performed the most meritoriously during the meeting.—First, Latham, for his flight of nearly six miles in a high wind, on the Antoinette monoplane, £300. Second, Paulhan (Farman biplane), for his flight of nearly sixteen miles in a wind varying from fifteen to twenty-three miles an hour, £150. Third, Rougier (Voisin biplane), for his high flight of nearly eighteen miles, £50.

DONCASTER

Nicholson Cup, five circuits, speed.—Delagrange, 7 miles 495 yards in 10 min. 44⅗ sec.; Sommer, same distance in 10 min. 50⅗sec. Delagrange thus won the cup by 6sec.—a remarkable result considering that he flew in his Blériot with the Gnome motor, while Sommer flew in the Farman biplane, of which less speed was expected. Sommer also flew 5 miles 1,595 yards in 9 min. 7 sec.

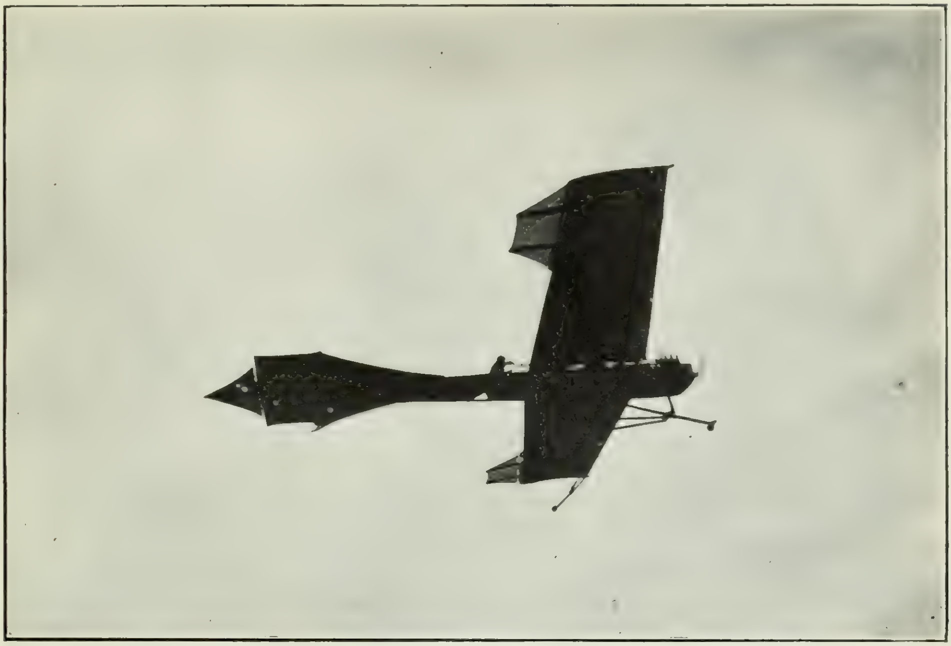
Doncaster Cup, aggregate distance for meeting.—Sommer, 136 miles 280 yards; Le Blon, 39 miles 1,745 yards; Delagrange, 29 miles 795 yards; Molon, 17 miles 1,525 yards; Cody, 2 miles 1,560 yards.

Doncaster Tradesmen's Cup, fastest circuit, 1 mile 860 yards.—Delagrange, 1 min. 47⅕ sec.

Chairman's Cup, speed over five circuits.—Sommer, 7 miles 495 yards in 12 min. 27⅗ sec.

Whitworth Cup, greatest total distance for the day.—Sommer, 38 miles 1,580 yards; Delagrange, 5 miles 1,675 yards; Molon, 2 miles 1,435 yards.

The total distance flown and officially recorded during the meeting exceeded 226 miles.



Hubert Latham in the Antoinette

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CHAPTER VIII

BIG RACES

In the spring of 1910 what seemed to be the fantastic project of an aeroplane race from London to Manchester took definite form, inspired by the late Lord Northcliffe's offer of a prize of £10,000. Save for M. Blériot's feat, the Channel remained unconquered. There had been flying meetings in England, and a number of cross-country flights, but now the ancient travel track, 186 miles long, between the two greatest English cities was to be the course for an aerial speed contest in which an Englishman and a Frenchman were to be the antagonists, both on French machines. Cody might have been another champion for England, and that on an all-British machine; but it was left to Mr. Claude Grahame-White and M. Louis Paulhan, both flying Farman-Gnome biplanes, to take the field. Mr. Grahame-White made two gallant attempts, but failed heroically and dramatically.

The conditions of the prize were that the flight was to be accomplished in twenty-four hours with no more than two stopping places for refuelling. On Saturday, April 23rd, Mr. Grahame-White made his first attempt; but four miles south of Lichfield he was obliged to give up on account of engine trouble, after having flown 117 miles of the course of 186 miles. His start had been fixed for five o'clock from Park Royal. At four o'clock we were eagerly discussing the weather. Until just before daybreak the sky had been clear and star-lit, and it was cold, but at about four o'clock the moon sank behind an ominous bank of cloud. Luckily there was no wind. Mr. Grahame-White, with Mr. Henry Farman, arrived about half-past four, and by this time two or three hundred people had gathered, sceptics many of them. Others, aware of improvements in machine and engine, were confident. The machine was the latest Farman type, without the side vertical panels in the tail of the earlier Farmans. The wheel under the tail was also removed, and a simple skid introduced. The machine was lighter and more graceful. For this journey it had three petrol tanks carrying fuel for six hours. The motor was the seven cylinder, 50 h.p. Gnome.

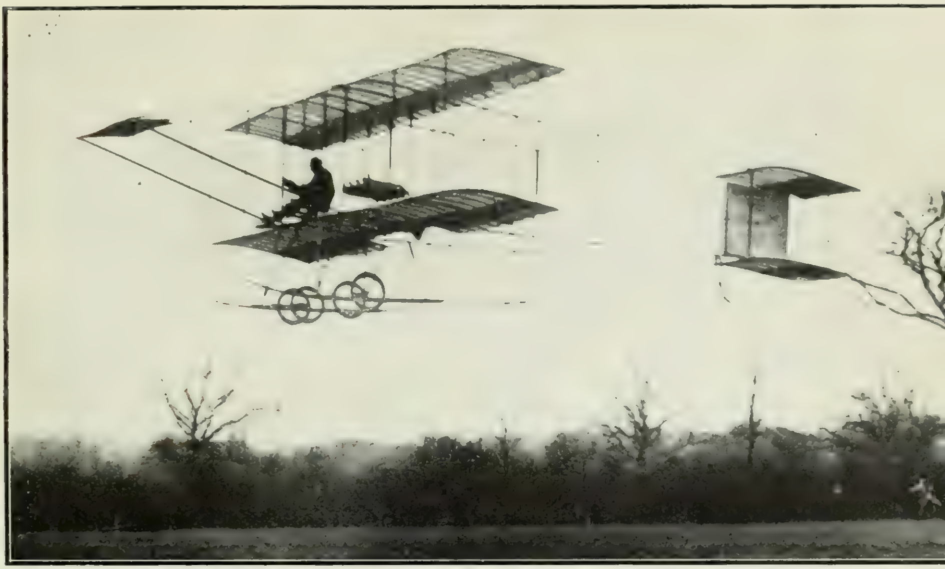
At twelve minutes past five Mr. Grahame-White started from Park Royal, and at 5.15 he reached the appointed observation post near Wormwood Scrubs and passed over the gasholders at Kensal Rise, where Mr. H. Perrin, the Aero Club official, seated astride one of the girders, with a drop of 160 feet clear below him, dipped his flag three times to show the airman he had fulfilled the conditions of the start. Directly after this Mr. Perrin set out for Rugby by car following those of us who had already started.

Great crowds had assembled along the railway line in Northamptonshire, and Mr. Grahame-White was flying at no great height. All along the route he was loudly cheered, and he was given an enthusiastic reception at Weedon, where the garrison turned out.

Rugby was reached at 7.20 a.m., and the crowd was atonished at the ease and grace of the machine as the airman, apparently looking for a landing place, circled over the tops of the trees. Helpers shouted and ran down the slope waving white sheets to attract his attention. After some time, seeing them, he flew straight in, stopped his engine, and glided gently down. Owing, however, to contact with a hillock one of the undercarriage struts of the machine was broken. Mr. Grahame-White had made a cross-country flight of 83 miles, a "record" for Great Britain.

Considering the nature of the country, he had made one of the finest flights ever achieved. He was blue with cold, and walked painfully for a few minutes, but he tried to smile in answer to the cheers that greeted him. He said it had been wretchedly cold all the way. He was familiar with the country between London and Rugby, and had no difficulty in finding his way; but he had clearly seen the first patch of whitened railway sleepers at Roade, indicating the line to follow. He had overtaken and passed three or four railway trains. He had nowhere flown higher than 1,100 feet and his average height was only 400 feet.

At 8.25 he took off again. He passed close to the roof of the L. & N. W. Railway station, and the engine drivers greeted him with a chorus of whistles. Here his aeroplane was caught in gusts and eddies, and it swayed and rocked. This second stage was another splendid exhibition; the airman flew over towns and hills and woods, not attempting to keep to flat, open country. The crowds at Nuneaton, nearly 100 miles from the starting point, were confident he would win the prize, but when only thirty miles beyond Rugby his engine gave trouble through the breaking of a small screw in the inlet valve of one of the cylinders. A stiff breeze was blowing, and Mr. Grahame-White



London—Manchester Rac
Mr. Grahame-White leaving Rugb

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accomplished a difficult landing in a field at Hadmore, four miles south of Lichfield. In the landing a skid was broken. Assistance was telegraphed for, and the French mechanics who had been following the flight in a car soon had the repairs well in hand, under the direction of Mr. Farman himself. The owner of the field where the aeroplane came down charged the public for admission, and the crowd was kept back by troops.

The third and last stage would now have to be one of 63 miles. Meanwhile the wind was steadily increasing, and unless it fell at sunset it was clear to everyone that a resumption of the journey would be impossible. At 7 p.m. Mr. Grahame-White was obliged to give up the idea of continuing, but determined that he would start before daybreak, about three o'clock, which would give him plenty of time to reach Manchester before 5.15 a.m. Sunday morning, when the twenty-four hours' limit would be up. Hundreds waited all night in the hope of seeing him resume his flight, but the wind grew stronger instead of falling, and he had to abandon the flight. He then announced his intention of going on to Manchester and of making a fresh attempt from there. But his aeroplane, which had been left in a field, was blown over by the wind, and several stays and some of the struts were broken, and the wings themselves damaged. The airman, unshaken by the mishap, promptly sent in the necessary twenty-four hours' notice for a second attempt to fly from London to Manchester.

That evening (Sunday) M. Louis Paulhan, the holder of the world record for cross-country flying, arrived in London and gave notice that he hoped to fly from London to Manchester on the following Wednesday. His machine was a similar one to that used by Mr. Grahame-White; its pilot was a contrast to the tall Englishman, being a small, vivacious blonde with short moustaches.

Wednesday came and M. Paulhan and his assistants were busy putting the machine together in a field between Hendon and Edgware, where shortly afterwards Hendon aerodrome was laid out. Mr. Grahame-White meanwhile was finishing the repairs to his aeroplane at Wormwood Scrubs. There were large crowds at both places, but British sympathy was naturally on the side of Mr. Grahame-White, and the fact that by comparison with Mr. Paulhan he was but a novice made him a popular hero. From midnight a stream of people flowed towards Wormwood Scrubs, and by ten o'clock the crowd numbered several thousands.

At two o'clock in the afternoon when M. Paulhan was still erecting his machine, Mr. Grahame-White's mount was wheeled out, cheered by the crowd; but the wind was violent and gusty, and Mr. Farman said that any idea of beginning the flight in such conditions could not be entertained. But to test the machine after the repairs Mr. Grahame-White brought it round facing the wind, and started up the engine; and he made a short, straight flight of about 200 yards, rocking considerably in the wind.

Mr. Farman then went to Hendon to visit M. Paulhan, and by five o'clock the Frenchman's preparations were complete. By that time the wind had begun to moderate, and M. Paulhan decided to start, without any trial flights, and the big crowd were delighted at the prospect of a reward of their long vigil. M. Paulhan took off at 5.20 p.m., and it was not until three minutes to six that the news of his start reached Mr. Grahame-White. Nobody had foreseen that so much depended on an exact knowledge of the French pilot's movements, or a better service of information would have been organised. The crowd at Wormwood Scrubs had indeed begun to disperse when the news came, and the British pilot, who seemed to have been caught napping, hurried out to his machine.

At 6.30 the engine was started, and the sight of the aeroplane being wheeled to the eastern side of the ground brought back hundreds of people running and cheering as they saw Mr. Grahame-White climb into his seat.

He took off against the fresh breeze and flew fully half-a-mile before he began slowly to bring the aeroplane round with the wind. It rocked and swayed, and swept over Wormwood Scrubs at great speed, but the airman flew unfalteringly towards the most dangerous part of his journey, the network of railways at Kensal Rise. The wind bore him rapidly past until he had gone much farther towards London than was necessary, but he turned round the gasholder to the east, and in two minutes was lost to view. The W.S.W. wind was now blowing almost at right angles to his course. He passed over Watford at ten minutes to seven, nearly an hour behind M. Paulhan, but he was flying much lower than his rival.

At Bletchley, an hour after M. Paulhan had passed, deafening cheers announced the coming of the British airman. He flew over Wolverhampton at 7.50, and five minutes afterwards came down for the night in a field at Ashton Road, near Roade, six miles south of Northampton, with the intention of carrying on at dawn. Then he heard that M. Paulhan had descended at Lichfield, and on that he altered his plans, and at one o'clock in the morning he announced that he would resume his journey as soon as the moon rose. M. Paulhan had a lead of nearly sixty miles.

At 2 a.m. the sky was obscured by masses of clouds, through which came fleeting glimpses of the moon. The breeze was increasing, bringing occasional rain. Mr. Grahame-White however, declared he would resume. Despite the early hour, a crowd had collected, and the road by the field was lined by motor-cars, most of them in readiness to follow the flight. Lamps were placed at each end of the field to mark the limits for a safe descent if the aviator should have to come down. The field was bounded on three sides by hedges and trees, and on the fourth the railway cutting with its bridge and telegraph lines was an obstacle which might well have made any airman hesitate.

The aeroplane was walked to the railway boundary from which the longest "take-off" run might be obtained. The moon broke through the clouds, shedding a welcome light on the scene. Mr. Grahame-White climbed into his seat, and the engine was started. For a few seconds he waited; then he held up his right hand, the assistants released their hold, and the aeroplane sped swiftly across the field, its wings visible over the dark ground. It seemed to be hurrying to certain destruction. The spectators were breathless with suspense as they watched it nearing the trees at the far end of the field. Then came a sudden roar of "He's up!"

Away over the black tree-tops he rose, and, making a wide sweep over the railway, was visible, silhouetted against the clouds before being swallowed up in the darkness, as he set his course towards Manchester. Car after car sped away in pursuit.

Three-quarters of an hour later the machine was seen in the sky at Rugby, thirty-four miles still separating the Englishman from M. Paulhan, who was then asleep. At Nuneaton Mr. Grahame-White was going well, but misfortune soon afterwards overtook him. The breeze had strengthened into a strong wind, and at Grendon, near Polesworth, only ten miles from Lichfield, and just when M. Paulhan, almost in a panic at the news of his rival's daring night ascent, was taking off from Lichfield, Mr. Grahame-White had to descend in a rather rough field at about 2 o'clock, where he was soon joined by those of us who had followed him by car.

He told us he had been forced to come down on account of the wind, which turned him round completely three times, and he thought it was no use to try to go on, as he could make no headway.

"The wind doesn't seem to bother him very much," he said, when he heard that M. Paulhan had started. The Frenchman was an experienced aviator before Mr. Grahame-White had begun to think about aeroplanes, but by his ascent in the dark the British airman had proved himself one of the most daring aviators of his time.

When the news came that M. Paulhan had landed safely at Manchester, Mr. Grahame-White mounted the seat of a car and announced his rival's victory to the crowd. He called for three cheers for M. Paulhan, whom he described as "the finest aviator the world has ever seen," adding, "Compared with him I am only a novice."

Towards four o'clock in the afternoon the wind moderated and he decided he would try to complete the flight. He made a successful ascent, but at Hademore he encountered a rain storm which loosened the fabric of his machine, and he was compelled to alight. When the rain abated he went up again. At Lichfield he landed, and the machine was dismantled and sent back to London, and Mr. Grahame-White left England the following day to take part in an aviation meeting at Barcelona.

M. Paulhan's greater experience had won for him the £10,000. Without a trial flight, and within twenty-four hours of the arrival of his machine in England, he had flown from London to Manchester, with only one halt at Lichfield, where he landed because of the darkness. He found the flight a great strain because of the wind, and he confessed afterwards he would not do it again for any money. He followed the line of the railway, except for brief periods, the route being indicated at junctions of the line by whitened sleepers. A special train, carrying Mme. Paulhan, M. Paulhan's assistants, spare stores and many enthusiasts, accompanied him, flying a big white signal cloth from the window of the rear coach. Great crowds cheered him all along the route.

Even when it was known at Burnage, near Manchester, that neither aviator could finish the journey on the Wednesday night, many refused to go far away, and put up at a neighbouring inn. At 4 a.m. about a hundred people were on the field, and an hour later between three and four thousand. Conflicting messages arrived, one saying that Mr. Grahame-White had started at 3 o'clock, another saying that both airmen were flying and were within twenty-five miles of each other. At 5.25 when dawn was just breaking and a cold drizzle was driving along on the south-west wind a report arrived by telephone at the station that an aeroplane was approaching. Every eye was gazing at the skyline of the houses and the trees to the south. The machine suddenly came into view, and cheer after cheer went up from the crowd, although they did not know whether it was the Frenchman's or the Englishman's. It came straight in at a height of about 1,000 feet; then it turned eastwards, and sinking lower and lower it seemed about to land on the other side of the railway. It turned, rose above the railway embankment and telegraph lines, headed south, and finally landed at 5.30 a.m.

The crowd threw off all restraint and rushed across the field to greet a smiling, but half-frozen airman.

M. Paulhan had many Continental engagements, and left England on the following Saturday, immediately after the luncheon given him at the Savoy, and the presentation of the £10,000 in a golden casket. Lord Northcliffe gave Mr. Grahame-White a 100-guinea cup in recognition of his splendid effort; and certainly the greatest feat during the whole contest was the Englishman's night ascent from Roade, for at that time night flying was regarded as belonging to a somewhat problematical development of the future. It is interesting to recall the fact that in some of its reports of this contest the *Times* referred to the aeroplane as an " airship ".

The European Circuit in June-July of the following year (1911) was the next big contest in which British flyers were engaged. The Paris-Madrid race in the previous May had no British entrants, neither had the Paris-Rome-Turin race, which immediately followed it. In the Paris-Madrid contest the airmen started from Issy-les-Moulineaux aerodrome on Sunday, May 21, and Jules Védrines, having flown over the Pyrenees, arrived at Madrid at 8 o'clock on the following Friday morning. While over the Pyrenees an eagle made four attempts to attack his aeroplane, never quite closing with it.

The start of this race was marred by the terrible fatal accident to M. Berteaux, the French War Minister, and the injury to M. Monis, the Premier. The crowd had got beyond the line of police and troops, and the aviator, M. Train, who was forced to land again after having started, had not sufficient room, and the spectators could not get aside quickly enough. M. Berteaux was killed instantly by the propeller, and M. Monis sustained terrible injuries to the face, notwithstanding which he at once gave an order that the race was not to be interrupted or postponed.

As an example of French spirit it is worthy of record that a week afterwards the new War Minister, accompanied by the son of the injured Premier, attended at 4 a.m. the start of another flying competition.

Three fatal accidents overshadowed the opening of the Circuit of Europe race, Lieut. Princeteau's Blériot monoplane capsized and caught fire; M. Landron and M. Lemartin were also killed.

The race was promoted by the *Standard* in co-operation with *Le Journal*, and was divided into stages, Paris-Liège, Liège-Spa-Liège, Liège-Utrecht, Utrecht-Brussels, Brussels-Rubaix, Rubaix-Calais, Calais-Dover, Dover-London, London-Dover, Dover-Calais, Calais-Paris; a total of 1,025 miles. There was no very difficult country to fly over, as in the Paris-Madrid and in the Paris-Rome-Turin races, and the airmen were guided by patrol boats when crossing the Channel. They were allowed to change their machines at any of the stopping places. The prizes, which amounted to nearly £20,000, were so divided that each competitor had a good chance of recouping himself for expenses by doing well in one of the stages. Of the sixty entrants, thirty-eight started, and nine completed within the stipulated time, six of them on July 7, the other three on July 8. From the start until the crossing of the Channel the weather was very bad, and the airmen took big risks.

There were two Englishmen in the contest, James Valentine, on a Deperdussin, and Mr. Oscar Morison on a Morane monoplane. Mr. Morison, however, fell into some trees a few minutes after the start, and gave up. British-made aeroplanes were represented by the Bristol biplane, flown by M. Tabuteau.

The most interesting stage was the crossing of the Channel on July 3. It was less than two years since M. Blériot had crossed, and since that day only six airmen had flown the Straits; and now came eleven all in one day. Dover waited up all night, and was well rewarded, for the eleven airmen arrived within a period of three-quarters of an hour. Védrines landed at 4.38 a.m., then Vidart, Gibert, and Beaumont. (André Beaumont was the name under which for Service reasons Lieut. J. Conneau flew). Kimmerling and Garros followed; then Valentine, the Englishman, who naturally had a great reception. Train was also loudly cheered, for he had made his own machine, and had not the help of a crowd of mechanics which most of the others had. At. Calais a collection was made for him. After Train, came the first biplane, the British-made Bristol flown by M. Tabuteau, who descended in a sensational spiral from a great height; then came E. Renaux on another biplane, followed by the eleventh man, Barra.

The departure for Hendon via Shoreham had been fixed for 7 a.m., but the airmen, led by Védrines, protested at this arrangement on account of the threatening weather, and declared their intention to start at six. The committee yielded, although it meant disappointing the public who were coming to see them start. By six o'clock the wind was blowing in sharp gusts from the north, and rain threatened. Védrines started, however, and was followed by the others in the order in which they arrived.

With the exception of Train, Renaux, Gibert and Barra, who had to land elsewhere, they arrived at Hendon more than an hour before the public expected them, and very few people were there to welcome them. Védrines came in first, about half-past eight, then Vidart twenty-five minutes later, and Kimmerling, after him, came in from a height of about 3,000 feet. Beaumont arrived also from a high altitude, eight minutes after Kimmerling. Then came Valentine and Garros with only one minute, forty-three seconds, dividing them. There was an interval of over an hour-and-a-half before the next arrival, and during this time Mr. C. C. Paterson gave exhibition flights in a "Baby" Grahame-White biplane. Lieut. Barrington-Kennet, of the Coldstream Guards, a member of the Army Air Battalion, also gave a fine display of flying on a military Bristol biplane. On flying his machine from Farnborough to Hendon his petrol feed-pipe went wrong when he was over Uxbridge, and he landed in a space so confined that he was said to have "alighted on a tablecloth". Having patched up his machine he continued his flight to Hendon.

Then came the announcement that Renaux had been seen over Watford. A few minutes later Tabuteau appeared from that direction. Renaux, it afterwards appeared, had descended at Eastbourne. Tabuteau had lost his way, and gone eleven miles off his course. Of the other three, Train had landed at Newhaven for a new propeller, Gibert at Dorking, and Barra came down near Eastbourne. However, Barra, Gibert and Renaux reached Hendon before night.

Before starting on the homeward stages to Dover, Calais and Paris the airmen were entertained to luncheon at the Savoy.

The winner was "Beaumont". In the final classification he won £6,466, Garros £2,240, Vidart £2,172, Védrines £2,080, Gibert £1,360. There remained about £4,000 to be divided between Kimmerling, who was sixth, Renaux (7), Barra (8), Tabuteau (9), and two or three others who failed to complete the Circuit, but gained minor prizes attached to various stages of the race. Though Védrines came in first at six of the ten stages, it will be seen he took only fourth place in the final classification, whereas "Beaumont", who covered only one stage in the shortest time, stood at the head of the list. Garros, who gained no prize for a stage, was second. Védrine's comparatively low place, after winning six of the minor prizes, was due to mishaps and delays at some of the stages. The result of the contest, it was said at the time, showed that biplanes could not hope to compete successfully against monoplanes in speed.

Valentine completed only one stage—an important one, that of crossing from Calais to Dover. His was a typical chapter of accidents. He broke down at Rheims owing to a defect in his motor. He had no time to get to Liège, so flew towards Brussels. At Mons his magneto failed. He had to wait for a day while it was being repaired, and on Monday went on to Brussels, where he landed after dark. On leaving Roubaix his magneto again failed, and he had to change his machine at six o'clock in the evening, so that he could only get to Gravelines, where he arrived at half-past eight. There was a strong wind, against which he could only make seven-and-a-half miles an hour. He left the machine on the spot and went over to Eastchurch to see the Gordon Bennett. Returning to Gravelines on Sunday he flew to Calais, where he changed his motor. He was the eleventh and last to leave Calais, and was the fifth to arrive at Dover. Even then he was not at the end of his troubles, for at Shoreham he had to come down owing to the loosening of some nuts in his magneto.

While the European Circuit was being flown a German National Circuit was in progress.

A fortnight after the Circuit of Europe the Circuit of Britain race began. This competition was a great improvement on previous ones, for the conditions were arranged with the object of bringing out the general airworthiness of machines. Before the start five parts of each aeroplane and five parts of each engine were stamped, and any competitor who could not at the end of each control show at least two of these stamped parts on both aeroplane and motor untouched was disqualified. Propellers could be changed, and landing carriages renewed. At three of the twelve stages there were compulsory halts of twelve hours each, but stoppages between the fixed halting places and controls were added to the aviator's time. The route was Brooklands, Harrogate, Newcastle, Edinburgh, Stirling, Glasgow, Carlisle, Manchester, Bristol, Exeter, Salisbury Plain, Brighton, Brooklands. It was, of course, a very much more difficult course than the European Circuit, and covered a distance of 1,010 miles.

There were thirty entrants, and seventeen actual starters. British: G. Hamel, J. Valentine, H. J. D. Astley, S. F. Cody, Howard Pixton, C. C. Paterson, C. P. Pizey, Lieut. H. R. P. Reynolds, B. C. Hucks, Lieut. R. A. Cammell; French: J. Védrines, "Beaumont", G. Blanchet, De Montalent; Switzerland Audemars; America: C. T. Weymann; Austria: Lieut. H. Bier. All these completed the first stage to Hendon on Saturday, July 22nd, but not all reached Edinburgh.

The order of starting had been arranged by the drawing of lots, the competitors then being sent off at intervals of four minutes. The start was delayed for an hour on account of the great heat, (thermometer 92 degrees in the shade). Brooklands aerodrome, always tricky, was extremely dangerous that afternoon, the burning sun creating whirling eddies of air. A hot gusty wind was blowing fitfully from the south-west. "Beaumont", who did not know the difficulties of Brooklands, was very indignant when he heard of the postponement of the start until four o'clock.

The crowd all along the route was enormous. Before half-past three passengers for Golders Green were being turned off the Hampstead Tube railway at Chalk Farm, although there were miles and miles of ground from which the flying could be seen. Prince Henry of Prussia was among the spectators at Brooklands, and was much interested in Lieut. Bier and his Etrich monoplane, a bird-wing, inherently stable type fitted with an Austro-Daimler of 120 h.p. Lieut. Bier, after trying to get to a good altitude, landed again for readjustments. He started again, however, after a short delay. He was the only competitor who carried a passenger.

"Beaumont," on a Blériot, was the first to start, and he got away splendidly. He was followed by Mr. Astley on the "Birdling" monoplane. One of the foreign competitors commented scornfully on "the English Blériot" machine, but his scorn was changed to admiration as he watched the style with which Mr. Astley got away. Both machines lurched and swerved considerably, and it was evident conditions were very difficult.

After Mr. Astley, Mr. Compton Paterson took off, also in splendid style. Then came Lieut. J. C. Porte on a Deperdussin monoplane. He quickly came to grief, after an awkward ascent, at a spot where the previous flyers had struck a bad eddy. The machine side-slipped, and then plunged to earth. The crash was heard all over the field, and the relief can be imagined when through the cloud of dust the pilot was seen to get out of his seat unhurt.

Védrines was the next, on his Morane-Borel monoplane, and he was followed by Blanchet on a Bréguet biplane. Blanchet got into difficulties at the first eddy, where Porte had come to grief, and his engine gave trouble. He flew away to the east, and was dangerously near the tree tops, and being tossed about like a leaf in a gale. But he mastered the situation and flew unfalteringly to Hendon. Lieut. Cammell, of the Air Battalion, on a Blériot monoplane was the next off, followed by Audemars; then James Valentine. Mr. Gordon England made a bad start, failing two or three times and then deciding to change his propeller. He was on a Bristol biplane, as was also the next starter, the late Collyns Pizy, who had difficulty with the eddies and gusts, but finally overcame them and started off in good style. Mr. C. H. Pixton was also flying a Bristol biplane, but he had a Renault engine in place of the Gnome used by the other two.

Cody's start was quite different from the others. He kept very near the ground and only just cleared the railing and trees. Hamel made a magnificent start on a Blériot monoplane. De Montalent's Bréguet biplane, with a Canton-Unné motor was watched with particular interest on account of novelties in its design; C. T. Weymann, on his fast Nieuport, started well, but when at a height of 500 feet, his route map blew loose and began to unwind, and he decided to come down and start again, as it might have blown about his face. Lieut. Reynolds got off well on the Howard Wright biplane, but Mr. F. Conway Jenkins crashed, happily without injury to himself. He was on a monoplane, the Blackburn, almost for the first time in his life.

Brindejonc des Moulinais had been injured in an accident a week before the start, and R. C. Fenwick smashed his machine while practising the previous day. Other non-starters were, Mr. O. C. Morison, whose eye had been injured by a cinder, P. Prier, who smashed his Bristol monoplane the day before, Mr. R. Kemp, whose Avro was smashed during an experimental flight, Mr. James Radley, Mr. Graham Gilmour, M. Tabuteau, Mr. R. Loraine, and Mr. H. Wijnmalen.

The second stage of the Circuit was from Hendon to Edinburgh, with compulsory stops at Harrogate and Newcastle. Védrines and "Beaumont" flew almost to schedule, arriving at Edinburgh at 11 o'clock and 11.18 respectively, and followed by Valentine five hours later. Hamel was delayed at Newcastle by repairs, but reached Edinburgh the following evening. Cody reached Harrogate, but did not continue till the morning, then damaged his machine soon after he passed Newcastle, and retired.

Of the others, M. Blanchet's engine failed near Luton, and he damaged his machine and retired; Hamel's machine was wrecked near Wakefield; Audemars lost himself in fog, returned to Hendon and retired; De Montalent also lost his way, and descended at Wetherby; Weymann reached Leeds after losing his way, and broke his chassis. He also retired. Mr. Astley got as far as Harrogate; Mr. Paterson retired at Hendon; Pizey reached Melton Mowbray, and retired; Mr. Pixton wrecked his machine at Spofforth; Lieut. Reynolds got to Harrogate, and damaged his machine; Hucks damaged his machine near Luton. Lieut. Bier, on the Etrich monoplane, had engine trouble, and retired near Hatfield, his machine badly damaged. That list of trouble is a good illustration of the early difficulties of flying.

Only "Beaumont" and Védrines completed the course of 1,010 miles, their times being, "Beaumont" 22 hours 28 minutes 18 seconds, Védrines 23 hours, 31 minutes 56 seconds. Valentine got as far as Carlisle.

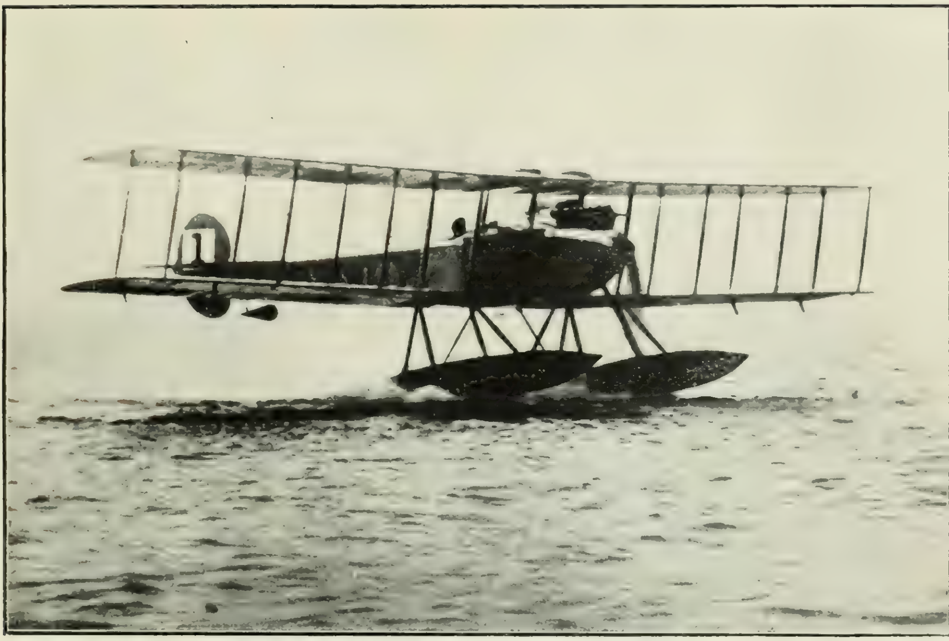
Another important race, although there was only one starter, and his machine was wrecked before it completed the course, was the Seaplane Race round Britain for which the late Lord Northcliffe offered a prize of £5,000 to the British airman who could complete the course—1,540 miles—in 72 hours, flying a British-made machine with a British-made engine. The route was by way of Southampton, Dover, Yarmouth, Scarborough, Aberdeen, Inverness, Oban, Dublin, Falmouth, Southampton. From the beginning nothing went right. The Admiralty raised objection to private flying machines coming near naval bases along the south and east coasts. Eventually, after much correspondence and many interviews between the Royal Aero Club, the War Office, and the Admiralty, the opposition was withdrawn after revision of the controls and an amendment of the rules. Finally, when everything possible had been done to make the contest practical, only four competitors entered, the Naval and Military authorities preventing their pilots from taking part. The four were, Cody, with his own machine fitted with 100 h.p. Green engine; Mr. T. O. M. Sopwith, with his Sopwith seaplane with 100 h.p. Green engine; Mr. F. K. McClean on a Short machine with 100 h.p. Green engine, and Mr. J. Radley and Mr. Gordon England on a Radley-England machine with 150 Sunbeam engine. Cody was killed in an accident at Farnborough almost on the eve of the contest. The Radley-England entry was withdrawn; and long after the departure of H. G. Hawker on Mr. Sopwith's machine Mr. McClean decided to withdraw owing to engine troubles. Hawker, accompanied by his mechanic, Mr. Kauper, was the only starter.

One of the rules was that a passenger must be carried; and the machine and engine, as in the Circuit of Britain race, were each stamped in five parts, two of which parts on both machine and engine had to be untouched on arrival at each control. The controls, as finally arranged with the Admiralty, were Ramsgate, Yarmouth, Scarborough, Aberdeen, Cromarty, Oban, Dublin, and Falmouth. A compulsory half-hour had to be spent at each for examination of the machines. Stoppages between the controls were not prohibited, but all alightings had to be on the sea, an inlet of the sea, an estuary, or a harbour. No repairs were allowed to be made at the controls, but repairs and replacements could be made en route.

The opening date of the race was August 16th, the closing date sunset on August 30th. On August 16th Hawker started and made splendid progress until Yarmouth (240 miles) was reached, in just under 4 hours flying time. There he had to give up, for the strong sun and the exhaust gases from the engine had made him ill. Mr. Sidney Pickles was hurriedly sent to take his place, but the weather broke, and heavy waves prevented the machine from rising, and the attempt had to be given up.

After a delay of six days the machine, on August 25th, was back at its starting point at Calshot, and Hawker, fully recovered, was ready to make another try. Only five days were now left before the competition closed. Everything went well as far as Seaham (440 miles) when some slight mechanical trouble developed and he had to come down; but he was soon able to continue. After a further 55 miles flying the trouble recurred, and he had to descend at Bradnell for the night, after a total flight of 495 miles for the day; the following day the flight was resumed at 8.5 a.m., and by 6 p.m. the sixth control, Oban, was reached. On Wednesday morning, immediately after the start, a descent had to be made to pump out one of the floats, which had become water-logged. This made an hour's delay, a serious matter, as minutes were now precious. Larne (947 miles) was left at 11 o'clock. A sparking plug had been giving trouble, but this was rectified, and all went well until Hawker and his companion were almost at the Kingsdown (Dublin) control (1,060 miles). They were then travelling very low—about 60 feet above a shallow lagoon—when Hawker made a mistake with his steering gear caused by his foot slipping from the greasy pedal. The machine immediately plunged into the sea, and was too badly damaged to be repaired in time to continue the race. Hawker escaped serious injury, but when Kauper was rescued by the Coastguards he was found to have a broken arm and severe head cuts.

Thus, the contest was dogged by bad luck from the very beginning. But it was not a failure. Hawker's was the most successful seaplane flight until that time, and it demonstrated the excellent qualities of the pilot, the engine, and the machine. Lord Northcliffe gave Hawker £1,000 in recognition of his fine attempt.



Sopwith 100 H.P. Gree
flown by Hawker in Round-Britain Rac

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CHAPTER IX

MY NOTEBOOK—I

CLASSIFICATION is almost impossible in a book dealing with a subject of so many aspects as aeronautics. The chronological basis, strictly adhered to, would be a meaningless string of events but little related to each other. And I find, after arranging chapters on specific subjects, such as airships, or the story of Brooklands, there remain immense quantities of notes on important and interesting events and people which must be referred to. In addition to the matter dealt with in the chapters with titles which indicate their nature, a great deal of air activity was in progress. Nor can all this material be treated in one chapter. I find it advisable to divide it roughly into three periods, and to pray that the reader will not regard it as less interesting or important than the other parts of the book.

In order to recall the conditions, circumstances, and "atmosphere" I would remind the reader that early in 1909 a very large number of prizes for flying and for flying machines were being contested or had recently been won.

The following is a list of the more important prizes open to airships, aeroplanes, and other flying machines in 1907:—

"DAILY MAIL" PRIZE.—For an aeroplane flight by a member of an established Aero Club from a given spot within five miles of the London office of the *Daily Mail*, to within five miles of the Manchester office of the same paper. (Petrol could be taken in *en route*) 160 miles.	£10,000
THE ADAMS MANUFACTURING CO.—To the winner of the *Daily Mail* prize, provided his aeroplane was made entirely in the British Empire.	£2,000
THE AUTOCAR.—To the maker of the petrol engine driving the winning aeroplane in the *Daily Mail* prize, provided the engine was of British manufacture.	£500
MR. NORTON GRIFFITHS.—An international trophy to the airman who flew the longest distance in any one year.	
LORD MONTAGU OF BEAULIEU.—An international annual trophy, worth £525, for the longest distance flown by a machine in the United Kingdom during any one year, from January 1 to December 31, beginning in 1907. In addition, £5 a mile (above 25 miles) for the longest distance covered in any one flight up to 200 miles; and also	

a suitable plot of ground on his estate of Beaulieu, for the erection of a construction shed by a British firm; for a period of two years from January 1, 1907.	£1,525
“The Graphic” and “Daily Graphic”.—For the first aeroplane which, with one or more passengers, flew between two given points not less than a mile apart, the contest to take place over the Brooklands track.	£1,000
The Brooklands Automobile Racing Club.—For the first aeroplane to cover one lap (3 miles) of their motor course in eighteen minutes, or at the rate of 10 miles per hour, at an altitude of between 30 and 50 feet from the ground.	£2,500
Messrs. Ruinart Père et Fils.—For the first machine, heavier than air, to fly across the Channel, in either direction before January 1, 1910 (shortest distance 22 miles).	£500
The “Matin” Prize.—To the owner of the first airship to fly from London to Paris on July 14, 1908, or subsequent fixed date (213 miles)	£10,000
Messrs. Barnum and Bailey.—For a successful flying machine, which would make a series of daily exhibition flights (together with a salary to the operator).	£2,000
The Deutsch–Archdeacon Prize.—For the first aeroplane to fly one kilometre (⅝ mile) in closed circuit, open to October 1, 1909.	£2,000
Paris–Ostende Prize.—Offered by the Societé des Bains de Mer d’Ostende for the first aeroplane or other heavier-than-air machine to fly from Paris to Ostende in less than twenty-four hours, on the second Sunday in August or following Sundays, (164 miles).	£8,000
Henry Deutsch de la Meuthe Cup.—Worth £400, and for the first three years a money prize of £800 every year, for the first airship or heavier-than-air machine accomplishing the circuit Terrasse de Saint-Germain, Senlis, Meaux, Melun, Terrasse de Saint-Germain. Open every year from March 1 to October 30. The second holder to accomplish the course at a speed one-tenth greater than the former holder (124 miles).	£2,800
Gordon Bennett Cup.—Open to balloons and airships, of a value of £500, with a money prize of £500 to the first. For the following year, prizes amounting to £500 were offered by the City of Saint Louis.	£1,500
E. Archdeacon Cup (then held by M. Santos-Dumont)—For a longer flight than 220 metres.	£120
“Daily Mail” Prizes for Model Aeroplanes.—In connection with the Aero Club Exhibition, April 6–13, 1907,	£250
Other Prizes were offered by M. Pepin, of the Aero Club du Sud-Oust; by Mr. Frank Hedges Butler and Sir David Salomans, of the Aero Club of the United Kingdom	
Total	£44,695

By April 1909 the number of prizes had increased almost beyond reckoning. The following list was published in *Flight.*

My Notebook

ABBREVIATIONS

Control
A.C.F. = Automobile Club de France.
Ae.C. = Aero Club of the United Kingdom.
Ae.C.A. = Aero Club of America.
Ae.C.F. = Aero Club of France.
Ae.C.N. = Nice Aero Club.
Ae.C.l'O. = Aero Club de l'Oise.

Control
Ae.C.S.O. = Aero Club de Sud Ouest.
A.e.C.V. = Aero Club of Vichy.
B.Ae.C. = Bavarian Aero Club.
Be.Ae.C. = Belgian Aero Club.
F.A.I. = Fédération Aeronautique Internationale.
L.M.A. = Ligue Meridienale Aerienne.

Control
L.N. = Ligue Nationale Aerienne.
M.I.S.C. = Monaco International Sporting Club.
S.Ae.C. = Aero Club de Sarthe
S.E.A. = Société d'Encouragement à l'Aviation.

RACES (Flights to take place on a Specified Date).

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
1 kilom. (L.N.) ..	1,000 fr.	3 prizes. I kilom. out and back. Owners only (French). On Dec. 3, '08, Feb. 3, '09, and April 3, '09		
20 kilom. (L.N.) ..	20,000 fr.	French aviators. At Savigny-sur-Orge. Each competitor allowed 3 flights		
Compiègne-Paris (Ae.C.l'O.)	—	Proposed. One halt	1909	
Pau-Biarritz	20,000 fr.	Proposed. Pau to Biarritz and back. Municipal control.		
Ostend-Paris (Kursaal) ..	£8,000	Airships and aeroplanes. Open any Sunday in any August		
Bordeaux-Paris (" L'Auto ")	12,000 fr.	Proposed. 592 kiloms. in five daily stages; F.A.I. rules	1910	
Angers-Saumur-Angers (Anjou Cup)	Cup, prize	Proposed by Anjou Central Committee; 90 kiloms. along banks of Loire. Owners only. For the Grand Prix week	Sept., '09	
Grand Prix (Ae.C.F.) ..	100,000 fr.	Proposed 3-day meeting	1909	
Monaco-Cap Martin ..	100,000 fr.	3 flights, between 10 a.m. and 5 p.m., each on a different day, between Jan. 24 and April 23, '09. 1st prize, 75,000 fr.; 2nd, 15,000 fr.; 3rd, 10,000 fr. Entries closed Mar. 15, '09	—, '09	
Brescia Circuit (Ae.C.I.)	100,000 fr.	Course of 10 kiloms. to be covered 10 times	Sept., '09	
Grand Prix (Auto. C.F.)	200,000 fr.	Proposed for 1909	1909	
200 metres	—	Proposed for Dec. 8, '08	—	Lapsed unwon
Brussels-Ostend (Dernier Heure)	10,000 fr.	Aviator making record flight from Brussels to Ostend and back, or equivalent distance in Belgium, between Aug. 15 and Oct. 1, '09	Oct. 1, '09	

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Gordon-Bennett (Ae.C.F.)	Cup, prizes	Cup value 12,500 fr. and 3 money prizes of 25,000 fr. each, for 1909, 1910, and 1911 respectively. Winner to complete specified course ; if more than one completes, cup to go to competitor finishing in quickest time	1911	
Bagatelle-St. Adresse (Dufayel)	20,000 fr.	4 prizes ; 10,000, 5,000, 3,000, 2,000 fr. for 1st, 2nd, 3rd, and 4th in race, on July 18, '09. 5,000 fr. extra if winner carries a lady passenger		
Two o'clock Prize (L.N.)	1,000 fr.	Start at 2 p.m,. Jan. 3, '09, finish 2.5 p.m. Winner to fly max. distance in the 5 mins.	Jan. 3, '09	Lapsed unwon
Prix Commission Sportive	10,000 fr.	Aeroplanes and airships not exceeding 1,200 cub. metres. Distance not to exceed 170 kiloms. across country		
Argentina	£8,000	Proposed Grand Prix Aviation Race		

STRAIGHT DISTANCE (Flights may be made over any Course).

25 metres (Archdeacon) . .	Cup	" Archdeacon Cup."		Santos Dumont, Farman, Delagrange
200 metres (Ae.C.F.) . .	200 fr.	3 prizes and medals for the first three aeroplanes to fly 200 metres.		Delagrange, Blériot, Chateau (Pelterie)
1 mile (*Daily Graphic*) . .	—	To be flown at Brooklands	July 31, '08	Lapsed unwon
1 mile (*Daily Mail*) . .	£1,000	All-British flyer and pilot	April 6, '10	
" 5 minute " (L.N.) . .	1,000 fr.	3 prizes for those who fly the longest distance in a duration of 5 mins. before Jan. 3, Mar. 3, May 3, '09. Open to French owners only, who must pilot their own machines		
" Petite Gironde 1,000 fr. Prize "	1,000 fr.	1st Frenchman to double W. Wright's record as it stands at the time the attempt is made		
" Triaca "	500 fr.	Max. flight by Aero Club of France and American Aero Club. Members only	Dec. 31, '08	W. Wright
" Hector Passega " . .	1,000 fr.	1st aviator who beats, in France, the records for distance held by W. Wright		
Belgian Kilom. Medal . .	Medal	Awarded by Belgian Aero Club to all Belgians who fly a straight kilom. in Belgium during '09		

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
250 metres (Ae.C.F.) ..	200 fr.	3 prizes and medals for beginners who fly 250 metres. Won by Count de Lambert, P. Tissandier, and Demanest		
150 metres (Ae.C.F.) ..	—	.. ..	—	H. Farman
"L.M.A." Prize ..	1,000 fr.	1st aviator who flies 100 metres in Gironde country		
500 metres ("Aeronautics")	50 dols.	4 prizes for 1st pilots flying 500 metres in the presence of repsonsible witnesses. Competitors must not yet have flown this distance		
ANNUAL				
"Car" Trophy (Lord Montagu)	—	To be held for the ensuing year by the aviator who flies the max. distance in the United Kingdom	Perpetual	
"Scientific American" Trophy	—	Progressive conditions	Perpetual	"June Bug"

CIRCUIT DISTANCE (*Circular Flights, i.e., made over a "Closed Circuit"*).

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
1 kilom. (Deutsch-Archdeacon)	50,000 fr.	1st "Grand Prix d'Aviation," founded Oct. '04, by MM. Deutsch and Archdeacon, to remain open 5 years	Sept. 30, '09	H. Farman
½ mile (*Daily Mail*) ..	£100	Was awarded to H. Farman for winning the 1st Grand Prix	—	H. Farman
Montefiore Prize ..	2,500 fr.	For the aviator holding the distance record on June 30, '08. Min. distance eligible = 5 kiloms		
Prix de la Commission (Ae.C.F.)	5,000 fr.	For the aviator holding the distance record on Sept. 30, '08; such distance to be at least twice the record established for the Montefiore Prize	Sept. 30, '09	W. Wrigh
Brooklands (B.A.R.C.) ..	£2,500	1st aviator to fly at 30 to 50 ft. high round the track ..	—	Lapsed unwon
Cie. d'Aviation Prize ..	1,000 fr.	1st lady aviator to fly a circular kilom.		
1 kilom (L.N.) ..	1,000 fr.	4 prizes for French owners who fly a circular kilom. on their own machines, and who have not yet won a prize valued at least 1,000 fr.		
Siot-Decauville Trophy ..	Trophy	1st army officer to accomplish circular kilom. on his own machine		
Poignant Prize ..	1,000 fr.	1st aviator who flies a circular distance of 100 kiloms. in less than 1 hour		
Michelin Prize ..	20,000 fr.	10 annual prizes of 20,000 fr. each for aviator holding record distance flight on Dec. 31 each year	Jan. 1, '18	W. Wright

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Deutsch Prize ..	20,000 fr.	3 annual prizes of 20,000 fr. each for a return flight over a 100 kiloms. straight course. Distance = 200 kiloms.		
Paris and Seine Prizes ..	20,000 fr.	Flight of 10 kiloms. over specified course at Vincennes or Issy, to be accomplished in less than 5 mins. Offered by Paris Municipal Council and Seine General Council	1909	
British Michelin Cup ..	Cup and £500	5 annual prizes of £500 each for aviator who, before sunset, Mar. 31 each year, shall have flown greatest distance in United Kingdom. Distance each year to be double that flown by previous holder		
Aero Club (U.K.) Prizes	£25	4 prizes of £25 each for 1st four flights of 250 yards at Shellbeach		
Aero Club (U.K.) Prizes	£50	3 prizes of £50 each for 1st three flights of 1 mile over closed circuit at Shellbeach		
Ormond-Daytona Prize	500 dols.	For flight of 1 mile on Florida Beach	Mar., '09	Lapsed unwon
ANNUAL				
Salomans Cup ..	—	.. ..	Perpetual	
Michelin Trophy ..	10,000 fr.	Trophy, value £400, held for the year by the winner of the current Michelin Prize	Jan. 1, '18	
Deutsch Trophy ..	10,000 fr.	Trophy, value 10,000 fr., held by the Club winning the Deutsch Prize	Perpetual	
		CROSS-COUNTRY PRIZES		
London-Manchester (*Daily Mail*)	£10,000	1st aeroplane to accomplish journey, about 185 miles, with 2 halts		
London-Manchester (Dumont)	£40	Medal for winner, presented by Santos Dumont		
London-Manchester (Montagu)	£1,000	Payable at the rate of £5 per mile for 1st attempt exceeding 25 miles		
London-Manchester (Adams Mfg. Co.)	£2,000	For winner if his machine is British built and has an Antoinette engine		
London-Manchester (" Autocar ")	£500	For winner if he uses a British-built engine		
London-Manchester (Griffiths)	Cup	Winner to hold this challenge cup for ensuing year ; presented by J. Norton Griffiths		

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Milan-Turin (*Gazetta della Sport*)	15,000 fr.	1st aviator to fly from Milan to Turin. Distance about 80 miles		
Chalons-Issy (Falco) ..	10,000 fr.	1st aviator to fly from camp at Chalons to Issy parade ground. Distance about 180 kiloms.		
' Petite Gironde 10,000 fr. Prize "	10,000 fr.	1st aviator who flies from la place des Quinconces, Bordeaux round the Cenon church tower. Circuit distance about 7 kiloms.		
Over Paris (" L'Auto ")	12,000 fr.	1st aviator who follows a specified route over Paris between 10 a.m. and 3 p.m. Aviators must previously have accomplished 20 kiloms. flight certified by Ae.C.F., 100 fr. entry		
Goupy Prize	1,000 fr.	For the aviator who has flown the longest distance in a straight line at min. speed of 40 k.p.h. on Jan. 3, '09	Jan. 3, '09	W. Wright
Pommery Prize ..	7,500 fr.	Half-yearly prize for the holder of the record in straight line flight. Winner holds 50,000 fr. Cup for ensuing 6 months. Cup becomes property of the first aviator who flies 1,000 kiloms. in 5 hours within 3 years	1911	
" La Nature " Prize ..	10,000 fr.	1st aviator who flies 100 kiloms. in 2 hours and lands within 5 kiloms. of his destination		
Arnoux Prize	1,000 fr.	1st aeroplane capable of flying a distance of 1 kilom. along a national road flanked by trees		
Over Paris (Falize) ..	3,000 fr.	1st aviator to fly from the Invalides round the Vendome column, the Arc de Triomphe, and land at the Invalides		
Rabourdin Prize ..	1,000 fr.	For the French aviator who holds the record of straight line flight on Oct. 31, '09	Oct. 31, '09	
Bagneres-Soulé ..	10,000 fr.	1st aviator to fly from summit of Pic du Midi de Bigorre to town of Bagneres		
Mechanics' Prize ..	Subscription	For the mechanic who times up the 1st aeroplane which flies 100 kiloms. from one town to another		
Lortet Prize	3,400 fr.*	*1 kilog. ingot of gold to first aviator who flies from Tarbes and descends on M. Lagard's property, 10 kiloms. away		
Morsang Sur Orge Prize	Plot of ground	For the aviator who lands within 50 metres of the plot of ground (situated on the Boulevard Beausejour) after flying 20 kiloms. across country, from any starting point.		

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
New York World Prize . .	£2,000 (10,000 dols.)	1st aviator to travel up the course of the Hudson River between New York and Albany. Distance 142 miles. If more than one competitor finish, prize will be awarded to aviator making fastest time	Oct., '09	
Madame Ch. Claudel Prize	1,000 fr.	For the 1st aviator to fly specified course over river at Rouen, and return to starting point		
Frankfort-Schveningen Prize	2,000 florins	For the 1st aviator to fly from grounds of Frankfort Exhibition to Schveningen		
Opel Prize	£1,000	For 1st German aviator to fly in less than 1 hour from Frankfurt to Russelsheim and back, making a descent at latter place	Oct., '09	
CROSS-CHANNEL PRIZES				
Daily Mail	£500	1st aeroplane to cross in either direction between sunrise and sunset during 1908	Dec. 31, '08	Lapsed unwon, and re-created.
Daily Mail	£1,000	Established when the 1908 prize lapsed ; open during 1909	Dec. 31, '09	
Ruinart	£500	1st aeroplane to cross. Attempts may be made only on 2nd and 4th Saturdays and Sundays in each month	Jan. 1, '10	
Deutsch	25,000 fr.	1st aeroplane or airship to cross with Col. Renard as passenger. Any starting point in France ; airship must land at Aldershot, but aeroplane may descend on the coast		
DURATION PRIZES (*Aviators to remain Aloft for a Specified Time*).				
¼-hour (Armengaud) . .	10,000 fr.	Aeronaut to remain in the air for 15 mins. (offered by M. Jeune Armengaud)	—	H. Farman
10 mins. (Gans) . .	10,000 mk.	Best flight of 10 mins. duration above selected spot. Sports Committee of Munich Exhibition. Between May 1, '08, and May 9, '09 (International)	May 5, '09	
" Touche à Tout " Prize	1,000 fr.	1st French aviator to remain for 1 hour in the air		
HEIGHT PRIZES (*Flights to be made at Specified Altitudes*).				
" Prix de la Hauteur " (Ae.C.F.)	2,500 fr.	1st aeroplane to jump over a row of balloons 25 metres from ground. Entry fee 25 fr.	—	H. Farman W. Wright

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
30 Metres Prize (S.Ae.C.)	1,000 fr.	1st to jump row of balloons at 30 metres from ground at Sarthe. If 30 metres altitude has been achieved elsewhere, balloons to ride 5 metres higher than the previous official record	—	W. Wright
100 Metres Prize (S.Ae.C.)	1,000 fr.	1st to jump row of balloons at 100 metres from ground, within 20 kiloms. of Le Mans. Or $1\frac{1}{2}$ times height of officially recorded flight elsewhere. Entry fee 25 fr.	—	W. Wright
Weiller Prize	1,000 fr.	1st Frenchman to beat Wright's high flight record		

PASSENGER FLIGHT PRIZES (Aviators to be accompanied by a Passenger).

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Michelin Special Prize	100,000 fr.	1st aviator who carries a passenger from the department of the Seine or Seine et Oise to the Puy de Dome in 6 hours	Jan. 1, '18	

CONCOURS (Aeronautical Meetings, including Various Events).

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Cannes	100,000 fr.	Proposed for Jan. 1, '09. Competition for aeroplanes and airships	1909	
Nice	50,000 fr.	Proposed by the Nice Ae.C.		
Turin	100,000 li.	Proposed by Aero Section of International Exhibition	1911	
Issy	1,000 fr.	Proposed meeting at Issy		
Rheims	160,000 fr.	Aviation week at Betheny to be held in Aug. or Sept., and to include 5 events, as follows :—(1) Duration test, (2) 30 kiloms. speed race, (3) speed race over circular course, (4) high flight trial, (5) passenger flight trial	1909	
Santander	£1,700	Proposed for Aug. or Sept., 1909		
Douai Municipal Prize	20,000 fr.	For competition in Douai district	July 18, '09	

MISCELLANEOUS PRIZES

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Prix Bernard Dubos	2,000 fr.			
L.N.	1,000 fr.	17 prizes of 1,000 fr. each offered by Mme. Quinton, Mme. Jane Falco, Mme. Passega, " L'Eclair," Combe, Captain Berger, Charles Stern, Déjardin, De Caters, David Mennet, Comte St.-Macary, Scheurer-Kestner, Edmond Archdeacon, Roland Gosselin, Ernest de Fontaines, Elèves (Arts and Manufactures), Ville de Biarritz		

TITLE AND DONOR	PRIZE	DETAILS AND REFERENCES	CLOSES	WINNER AND REFERENCES
Michel Mahieu Prize . .	1,000 fr.			
" La Prévoyance " Prize . .	1,000 fr.	Cie d'Assurances " La Prévoyance "		
Paul Crétenier Prize . .	1,000 fr.			
Baron Lagatineire Prize . .	5,000 fr.			
Soc. d'Encouragement's Cup . .	10,000 fr. Cup			
Ancient Elèves (Art et Metiers) Prize	2,000 fr.	For the first " old boy " who wins one of the L.N. prizes		
Ch. of Deputies Grant . .	100,000 fr.	To the Ae.C.F.		
" La Vie Financier " . .	1,000 fr.	For the owner of smallest aeroplane in height and breadth capable of lifting him from the earth		
René Quinton Prize . .	10,000 fr.	For the 1st aviator who, having stopped his engine, keeps aloft for 5 minutes without descending more than 50 metres		
Major Dollfus Prize . .	10,000 fr.	For the 1st kite which holds a man aloft at 200 metres for 1 hour. Conditions may be changed by the Tech. Committee of the L.N. with the consent of the donor	1912	
Soulé Prize	2,000 fr.	For the 1st aviator to glide down the sloping side of a mountain, altitude of 500 metres		
King Leopold of Belgium's Prize	£1,000	For best treatise on aerial navigation	1909	
Nice Model Trial . .	—	Proposed competition for aeroplane models coincident with Monaco Aeroplane Meeting	1909	
Commission d'Aviation Prize	500 fr. and 200 fr.	For the maker of engine used on aeroplane which has achieved the record distance flight up to June 30, '09. Presented by MM. Lariviere and R. Balsan	June 30, '09	
American Prize (anonymous)	20,000 dols.	Given anonymously as prize fund for encouragement of aeronautics in America		
Santos Dumont Prize . .	4,000 fr.			V. Beauclair
Vichy Prize	10,000 fr.	For flying competition in the Vichy district		
L.N.	1,000 fr.	Frenchmen only. Least push-off, no outside assistance. Course out and home to be identical		
Bader-Kahn	2,500 fr.	1st to alight on the terrace at their Boulevard Hausmann establishment. Aeroplane or airship		

My Notebook

One day in 1907 I saw a flying machine dismantled and in packing cases in the court-yard of the Savoy or the Cecil Hotel (I forget which). It belonged to M. Bellamy, who hoped to win a prize offered by Brooklands Automobile Racing Club. All I remember of his machine was its queer-looking, canvas-covered propeller and the experiments he made with it on a twin-float contrivance at Weybridge. On the water he obtained a speed of about eight miles per hour. The propeller looked like two almost rectangular sails carried on struts and set at a big angle of pitch. This was in 1907, and soon after I lost sight of M. Bellamy and his flying enterprises.

Those were the days of queer ideas and amazing pretensions and inventions. "A new airship fashioned after the bee" was one. Mr. F. W. Schroeder, a naturalised British subject, took as his model the action of the bee, after a study of the flight of that weight-carrying insect. The invention had some claim to be called an airship, for it presented the appearance of a ship with horizontal sails, but it was not an inflated gas-bag.

The lifting power of the Schroeder airship was to be supplied by a series of rotating sails or wings, mounted in pairs to rotate about a common vertical axis, but in opposite directions—in short, a helicopter.

One of the most alluring and a quite common idea of those days was that in which the pilot, generally accompanied by a crew and passengers in a comfortable car, was to be suspended far below the machinery. This was claimed to secure automatic stability. It is sufficient to say that it has hitherto proved impossible to overcome difficulties in the way of raising such a machine off the ground and of driving it through the air. The prospectuses of such schemes always conveniently ignored the difficulty of the transmission of power, and other thorny problems. Some day such a machine may be possible, but since aeronautical engineers at present find it impracticable it is unwise to believe a stranger (generally with no knowledge at all of mechanics or engineering) who claims to have achieved success.

Another favourite scheme was the valvular wing, in which the beating action of a bird's wing was imitated, or even improved upon!

In airships the schemes were equally attractive, but just as crude. In Great Britain there was the most profound ignorance on the subject, and the inventor who besieged the Patent Office with his applications for patents ignored the most elementary facts that concerned lighter-than-air aeronautics. He drew up schemes on paper without troubling to ascertain such facts as the pressure of the air on a given surface at different speeds.

He made the most incredible blunders. He assumed that an airship can tack to and fro like a marine vessel to gain a point in an adverse wind too strong for it to drive directly against. He assumed that an aeroplane can face the wind, stop its engine and remain hovering over one spot supported on the wind! He imagined that an aerial vessel can easily find its way when out of sight of land. In short, he committed every possible blunder himself, or assumed that his victims were to be taken in by the most glaring mis-statements.

By certain signs these traps, however, might be recognised by the investing public. The obvious precaution was to submit the scheme to some recognised authority, such as the Aeronautical Society, when it was generally found that the enterprise was wildly impracticable. Twenty years earlier the bicycle afforded much the same opportunity to the schemer and the visionary, and incidentally entailed a loss of £10,000,000 to the investing public. Nothing was too extravagant for exploitation. Thousands of people scrambled to take up shares in a certain chain which upset all mechanical theories, solved perpetual motion, and did other impossible things. The public, which at first scoffed at the pneumatic tyre, regarded the author of this chain freak with confidence, lost capital by the hundred thousand, and passed on to its next victimization.

Another notable example of what may be foisted on a gullible public was provided by a mechanical genius who argued that when a person slipped on a piece of orange peel his feet shot forward with more swift and certain dexterity than at any other period of his life! By constructing a bicycle that would execute a succession of slips a record forward momentum would be achieved! Couched in a wealth of mechanical jargon the idea sufficed to entice a preposterous sum from the pockets of usually sensible people.

In one advertisement of aeroplanes and accessories the Bible was quoted to emphasise the merits of a certain landing wheel. In others engines that were never publicly tried were declared to be superior to the Gnome, which was then taken as the standard of excellence. These are amusing instances; but there were pitfalls for the unwary in the advertisements of certain vendors of aeroplanes and of "instructors" in flying, when a little inquiry would have shown that the machines never succeeded in getting off the ground and that the "instructors" had themselves just failed to achieve flight.

My Notebook

Francesco de Lana's fallacy of the vacuum airship made an appearance in the lists of patents taken out in recent years in England. The fact was, of course, overlooked that in order to be light enough to ascend the vessels would have to be so fragile that they would collapse under atmospheric pressure. It almost goes without saying that in the new proposals the vessels were to be made of aluminium. The use of this light metal, however, would not overcome the difficulty. If deprived of air the vessels would have to be so stout to withstand atmospheric pressure that they would not be light enough to ascend. You must have gas of some sort to provide internal pressure. It is melancholy to think that such a fallacy as this could receive the approval, as it was claimed, of a qualified engineer.

An invention which promised to revolutionise the science of flight was registered in the joint names of Mr. H. K. Hales and Mr. Milner Hurd, who experimented with a small model helicopter. Two or more discs, four feet in diameter, were placed, paddle-wheel fashion, on either side of the main frame, and these were driven by an 18 h.p. motor, at 1,500 revolutions per minute, producing a similar effect to that achieved by the beating of the air by the wings of a bird without the shock of the mechanism which would be produced in the upward and downward beat of the wings. The discs were fitted with webs of flexible material, which alternately expanded and contracted as the disc revolved, the maximum area of resistance being always on one side of the disc while the minimum resistance was on the other side.

An Italian engineer in Marseilles claimed to have made a marvellous discovery, by means of which he could maintain a body suspended in space absolutely motionless. He was said to have invented an apparatus which could remain stationary at various heights in the air. His apparatus, which was cigar-shaped, four metres long, seventy-five centimetres in diameter, weighed ninety-five kilogrammes, and he claimed that it could raise forty-five kilos, that it could remain for twenty-four hours in the air, and come down at a point 200 kilometres from its starting point. All this was to be accomplished without any mechanical motive power, but merely by the use of Hertzian waves. The principle of this invention was based on the special distribution of electric and magnetic forces, thus allowing of reactions of repulsion and attraction.

A remarkable flying machine was invented by Mr. George L. O. Davidson, who claimed to have solved the problem of flight by adapting the law which governs natural flight. Mr. Davidson described his flying machine as a "gyropter", or rotary-wing, flying machine, consisting of a body, or car, the framework of which was eight feet broad and thirty feet long, with gyropters, or rotary wings, each twenty-seven feet, eight inches, in diameter.

The following letter from Mr. Davidson appeared in a newspaper:—

"Sir,—Will you permit me to correct some slight inaccuracies which I notice in the account of my Gyropter flying machine. First, I think it is hardly fair to designate me as the "latest" aspirant to the conquest of the air, seeing that I have studied the question for more than twenty-five years, and got over my attack of 'balloonatics' more than twenty years ago, when I discovered the simple law of Nature which permits all flying creatures to travel in the air. Second, the body framework of my machine is described as a sort of cradle suspended from the centre of the trusses, at the points of which the two gyropters, or rotary wings, lift the whole structure. A 'cradle' is apt to give the impression of something small and fragile, whereas the body part of my machine contains six rooms—the engine-room, on the lower floor, is 16 feet by 8 feet, by 6 feet 6 inches high. There are two rooms on the upper floor, 6 feet by 8 feet, and half-way up a room, both at front and rear end, measuring about 8 feet square each, besides the 'beak' house at the extreme forward end, from which the whole of the machinery is governed. This beak house is in the form of a half circle, with a diameter of 6 feet. It will thus be seen that there is ample room for more than 'the operator,' and I should probably not attempt to allow my machine to 'volate' without having at least a couple of engineers to attend to the engines, and there is plenty of room for a dozen passengers. The article continues: 'The whole is covered in with a light covering,' giving the impression that everything in connection with a flying machine must be light. On the contrary, the body part of the machine must be heavy, up to a certain point, in order to fly, and it is my intention to cover in the framework with a good substantial shell, that will resist the atmospheric pressure when cutting through the air at high speed."

Mr. Sandon Perkins was hoping, in February, 1909, to take an aeroplane to the North Pole, or rather the aeroplane was to take him from some northern point attained by means of a ship. His aeroplane had at least twelve propellers with rectangular blades, driven by chains from a central motor, and the lift was to be afforded by four flat planes arranged stepwise.

But let us to more practical matters. I find a note on a tour I made of flying grounds in the south-east of England. At Camber, near Rye, I found Mr. W. O. Manning, with the Howard-Wright biplane, condemned by bad weather to inaction. Mr. Seton-Karr had achieved short flights with this machine. Close to Mr. Seton-Karr's aeroplane shed was one belonging to Mr. A. Ogilvie, who was waiting for a Wright machine.

Wandering over the hills of Kent and Sussex one sometimes encountered experimenters with model gliding contrivances, which they tried in all sorts of weather and under the most trying conditions. It was refreshing to meet this enthusiasm.

In the late autumn of 1909, Lieutenants J. C. Porte and W. B. Pirie, two officers of the Submarine Department, were carrying out gliding experiments at Portsdown Hill, near Portsmouth. They carried out glides, both of them seated in the machine, but had many mishaps, each of which caused a long delay. Their experiments deserve a little description, especially as Lieut. Porte was to play a great part in British aviation.

On one occasion the glider was placed on a boat and towed by a pinnace from Fort Blockhouse to the chalk pit quay at Paulsgrove, where it was transferred to a motor-wheeled trolley, and a party of sailors, after a lot of work, hauled it up the side of the hill close to Fort Southwick. A wooden track, extending about a hundred yards down the hillside, had been laid down, and shortly after four o'clock all was ready. Lieutenant Porte then arrived on the scene, and after some adjustment of wires the machine was lifted on to the trolley. Lieutenants Porte and Pirie climbed into the seat, side by side, the former grasping the levers controlling the tail rudder and the elevators.

The end of the track had almost been reached when the glider soared slightly into the air. Then, still "flying", it canted forward in a slightly starboard direction, and turned half over. The two Lieutenants fell out of their seats, and scrambled clear. Beyond a slight scratch on Lieutenant Pirie's wrist, they were not injured. The lower portion of the framework of the machine and its runners were found to be completely smashed.

Captain H. L. Mackworth in 1909 built an aeroplane at Shorncliffe. This was a very light biplane weighing with its engine only 250 lbs. Light steel piping was used in its framework and the wings were silk-covered.

The Aeronautical Society (it was not "Royal" in those days) acquired a piece of land, which it called an "aerodrome", in 1909. This "weed preserve" was a patch of hillocky tumbled country near Dagenham. A number of large models, and one or two full-sized machines, were assembled there; and one day in August of that year the Society held a "private" meeting which, however, was attended by a host of newspaper photographers.

In any case the bad weather would have prevented flying. In a big shed the small Moreing non-rigid airship reposed, deflated. This airship was about 100 feet in length, and it was fitted with a 100 h.p. E.N.V. motor. Mr. Moreing also had a Voisin biplane with an E.N.V. motor there. Another exhibit was the Neale monoplane, an extremely small machine with a span of only 21 feet, a 12 h.p. J.A.P. engine, and total weight, including the pilot, of 420 lbs! This little machine had a biplane tail, each plane of which was separately controllable as regards angle of incidence. Major B. Baden Powell was there with his quadruplane, a biplane with an additional large plane forward and another large plane aft. Mr. Deverall Saul also showed a quadruplane. If my memory is not at fault the Moreing Voisin machine was to have been flown by Mr. Rawlinson, who flew at the first Bournemouth meeting. Some of the experimental aeroplanes had wings of many thicknesses of paper.

In 1909 William and Orville Wright came to England and I met them at the meeting of the Aeronautical Society where they were awarded the Gold Medal.

At the end of the year I gave the Cantor lectures (Royal Society of Arts) on Aeronautics—four lectures. There were two points in these lectures which I recall with, perhaps, pardonable pride. I made a feature of that essential element of aerial navigation that any flying machine, balloon or airship, is carried by the wind to the full extent of the velocity of the wind, but that if the air-craft is motor-driven it can move about in the current freely. Its speed in the same direction as the wind is its own independent speed plus that of the wind, and its speed in a contrary direction is its own speed minus that of the wind. It cannot "tack". I showed all this by diagrams, and got "a hand".

The other little thing was my demonstration, by means of a cardboard model, of looping the loop. At that time such an idea was unheard of; but within three or four years aviators were actually performing the feat.

Early in 1910 Captain E. M. Maitland crashed on his biplane while learning to fly on Salisbury Plain, and broke one

Dagenham Aerodrome, 1909

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ankle and dislocated the other. I remember visiting him at the King Edward VII Hospital for Officers in Grosvenor Gardens, and recall, as an instance of his pluck, that his one ambition at the moment was to go in for the world ballooning height record. We went into the calculations necessary for such an undertaking, for I was to be his companion, and I received the following letter from him while he was still in hospital:

> Saturday, August 13th.
>
> "I really don't think there could be a more fitting time for us to take on our height record scheme—say in October or end of September, as the eyes of all are on high flying, and the comparison being 6,000 feet in aeroplanes and 26,000 feet in balloons would really be most interesting to all interested in aeronautics. We would, of course, require as many self-recording instruments as possible to record all temperatures and air pressures as well as altitudes, and I can easily get hold of a statoscope and barograph. Do you think October too late in the year? I don't see why it should be; besides early October is different to the end of October. Tell me if you are really keen on the project, and if you consider we can obtain any really scientific observations which can be of any practical use to anybody. I am a Fellow of the Geographical Society and could get them perhaps to interest themselves in it, although it is rather out of their line. If we find, when we get to 18,000 or 20,000 feet, that we feel very uncomfortable or that our oxygen apparatus isn't working satisfactorily, we can always come down and have another go another day. I don't at all feel inclined to take any stupid risks of any description and am all for being *very* prudent."

But by the time his ankles had been put right he was caught up in more important affairs. One day in November, while he was still very lame, he and I went to Brooklands, where Captain Watkins had just learned to fly the Howard Wright machine. He had not quite completed his certificate flights, as a matter of fact, but Captain Maitland had a flight with him, and so did I. Maitland got his balloon "ticket" on November 22nd, 1910, his airship brevet on September, 19th, 1911, and his aviator's certificate (in France) on April 4, 1913. He was one of the very few possessors of all three.

During 1909 there had been numerous flights by the brothers Wright, Farman, Sommer, Engelhardt, Paulhan, Latham, Cody and others of over one hour's duration. The momentous flights of that year, in addition to those already mentioned, were

M. Blériot's crossing of the Straits of Dover on a monoplane on July 25th, Latham's nearly successful attempt to perform the same feat two days later, Latham's flight in a high wind at Blackpool, and the Comte de Lambert's flight from Juvisy over Paris, circling the Eiffel Tower at an altitude of over 1,200 feet.

The first aviation meeting ever held was that at Rheims in August, 1909, and, as already related, it was a triumphant success. Other aviation meetings were held at Juvisy, Marseilles, Brescia, Tournai, Boulogne, Spa, Berlin, Doncaster, Blackpool, Frankfort, and Antwerp.

An international congress was held at Nancy in September to discuss questions of aerial law and the establishment of a standard glossary of terms. The recommendations as to aerial law may be summarised as follows: Every country owns the atmospheric space above its territory, every aerial vessel should be registered, and carry passports and other papers, rendering identification easy; the idea of restricting aerial traffic to certain routes must be abandoned in favour of regulations forbidding aerial vessels to land at certain parts determined by considerations of national security; customs duties on foreign balloons ought to be abolished, but photographs taken by foreign aeronauts should be subject to inspection and possible confiscation; the "rule of the road" to be the same as that appyling to maritime traffic.

The British Government appointed a permanent Aeronautical Advisory Committee to investigate problems arising out of the practical work being done by the naval and military aeronauts. A special department was organised at the National Physical Laboratory at Teddington. The members first appointed to the committee were Lord Rayleigh, Dr. R. T. Glazebrook, Major-Gen. Sir Charles Hadden, Capt. R. H. S. Bacon, Sir A. G. Greenhill, Dr. W. N. Shaw, Mr. Horace Darwin, Mr. R. H. A. Mallock, Professor J. E. Petavel, and Mr. F. W. Lanchester.

The Government ordered a rigid dirigible balloon from Messrs. Vickers, Sons and Maxim.

The first catalogues and lists of aircraft and accessories make very interesting reading. Some of these, produced as long ago as 1909, are remarkably full. I am afraid the firms did not profit immediately to the full extent of their anticipations, and most of them went out of business.

From a big collection I select for mention here the list issued by Cochrane & Co., from premises in Clarges Street. Turning over its pages I find the Beadle propeller, also the Cochrane propeller, both having more or less half-moon blades. Some who read these pages will remember Mr. Cochrane, who was seen everywhere where flying men were assembled, and who did a considerable business. Here, too, is an advertisement of Lane's Gliding Schools at Ashingdon and Rochford. Another book of fittings and gliders is that of T. W. K. Clarke & Co., of Kingston.

Mr. Clarke was one of the moving spirits of the early days, and is a scientific man of high attainments. He was probably the first manufacturer, in this country, of aeronautical accessories. His name is not well known to the present generation of aeronautical enthusiasts, but he was one of the keenest of the pioneers, and though he devoted much of his time to models of gliders, helicopters, and parachutes, and later manufactured these and became known to every youthful expert, his work for aviation by no means ended there. He built gliders to his own and to clients' designs, and in 1909 he won the first prize in a design competition held by *Aeronautics*. Mr. Clarke also specialised in propellers, and made the airscrews for the "Mayfly", the first Naval rigid airship. One more of the interesting things he did was the renovation of the wreckage of the glider upon which Lieut. Pilcher was killed in 1899. This had been thrown aside in an outhouse, and then in an old disused station. Upon re-erecting it Mr. Clarke found that there were also the parts of a Lilienthal glider, with the renovation of which he was also entrusted.

The most ambitious trade catalogue of the early days was that of the Aeroplane Supply Company, which listed and illustrated complete aeroplanes, British and French, aero engines, parts and instruments. This was compiled by Mr. Bernard Isaac, who has already been mentioned in the chapter on Hendon. This firm offered to be universal providers in aviation, even to the extent of organising exhibitions, lectures and tours. I see that a Farman biplane with 50 h.p. Gnome motor was then listed at £1,120, or with 50 h.p. J.A.P. engine only £870. But it was not necessary to have an Air Ministry certificate of airworthiness in those days.

The first British firm to produce anything like a complete flying machine catalogue, I think, was Messrs. Markham and Prance, whose price list is extremely interesting. From it one gathers that a Blériot monoplane with a 25 h.p. Anzani motor cost £400; the Farman biplane, with either a Gnome or a Vivinus motor, was £1,000; a Voisin biplane complete cost £1,050; and an Antoinette monoplane cost from £1,000. Flight was guaranteed in all cases. The Farman machine would do a ten-mile flight before the purchase was complete.

With the Blériot was guaranteed a ten-minutes' flight. Delivery in all cases was promised in about three months. The Farman machine included free instructions and delivery in two months. A "British monoplane" was also in the list, but particulars were not given.

Another notable catalogue was the World's Aviation Catalogue, issued by the Aerial Manufacturing Company.

The aviators of those days received big fees for their appearances. Mr. Henry Farman required £2,000 to come to England for a week; M. Roger Sommer and M. Louis Paulhan asked each £1,000. Mr. Glenn Curtiss was given £1,000 on his return to America, after winning the Gordon Bennett race at Rheims, merely for the exhibition of his machine. Aviators were also paid "by the piece." Thus Captain Bertram Dickson, who was one of the first to make a spectacle of the glide with engine stopped, received as much as £500 for each glide at one meeting. This golden age soon passed, and it only affected "star" pilots, not the pioneers, designers and manufacturers, except when in rare cases they were "star" flyers too. It was an age of flying meetings, and if we merely considered aviation in their light it would be necessary to admit that flying has declined. It must be remembered, however, that it was a complete novelty, and almost regarded as a miracle in 1909 and 1910, and people paid to see it accordingly. A newspaper paragraph in January, 1910, is quoted here to illustrate the vogue of the flying meeting:

"The events of the immediate future are the meeting at Heliopolis, February 6-13, and the aeronautical exhibition at Olympia in March. A flying meeting is proceeding at Los Angeles, and a small scientific aeronautical exhibition is being held in Moscow. The Heliopolis meeting is quite likely to be as interesting as the great Rheims meeting. The entries include all the well-known types with the exception of the Wright biplane, but it is almost certain that among the entries yet to be made the famous American machine will be included. The list of fifteen names so far announced is certain to receive many additions. It includes: Monoplanes—Antoinette: Latham, Hauvette-Michelin, Hayden Sands; Blériot: Le Blon, de Lesseps, Balsan, Neale; Grade: Hans Grade. Biplanes:—Farman: Mortimer Singer, Durat; Voisin: Rougier, DeLaroche, Métrot, Gobron; Curtiss: de Reimsdyk. The list includes three Englishmen, Messrs. Singer, Neale, and Sands. It also includes the first woman who has ever entered for a flying meeting, but Mme. DeLaroche has not yet recovered from her recent accident, and may not be able to appear. Already the list contains some famous names, such as M. Latham, who to his splendid record has just added a flight to the wonderful height of 3,600 feet, which he will no doubt soon surpass. M. Le Blon achieved sudden fame by brilliant flying at Doncaster. M. de Lesseps and M. Rougier are accomplished flyers, and Mr. Mortimer Singer has been doing so well lately at Mourmelon that he is likely to prove one of the prize winners. Herr Grade is Germany's leading aeronaut, and has done some good flying, but he is at present incapacitated through a slight fall he had recently. His monoplane is not unlike the Blériot. He has already booked orders for twenty-two of them, and has won a prize of £2,000 for his flying. The prize money at the Heliopolis meeting will amount to £10,300. One of the contests is for a flight from Heliopolis to the Pyramids and back. The meeting will, indeed, have peculiar interest on account of the locality.

" Of the numerous international meetings arranged by the Federation in Paris, two will be held in Great Britain, the dates being July 11 to 16 and August 6 to 13. It is highly probable that these meetings will be at Bournemouth and Blackpool. The Aero Club have had numerous applications from towns anxious to have meetings, and it is likely that a few national meetings will be arranged, the Federation having passed a rule permitting the holding of purely national meetings at which the prizes must not exceed £2,000. By the spring England will be quite able to organise a very good meeting among its own flyers. The provisional list of fixtures is as follows: April 10 to 25, Nice; May 10 to 16, Berlin; May 20 to 30, Verona; June 5 to 15, Budapest; June 18 to 24, St. Petersburg; June 28 to July 10, Rheims; July 11 to 16, England; July 14 to 24, competition organised by the Automobile Club of France between Rheims and Brussels; July 24 to August 10, Belgium; August 6 to 13, England; August 25 to Sept. 4, Deauville; September 8 to 18, Bordeaux; September 24 to October 3, Milan; October 18 to November 2, Gordon Bennett race meeting in America."

At the beginning of 1910 the following were among the British experimenters at work. An asterisk is placed against the names of those who were said to have flown at that time, but this is very doubtful in some cases.

H. J. D. Astley	Antoinette monoplane	Brooklands
Graham Bell*	Tetrahedral-cell machine	Canada
A. W. & C. Barnard	Biplane	New Zealand
G. A. Barnes*	Monoplane	Abbeywood, Kent
H. Berfan	Monoplane	Accrington

Major Baden-Powell	Baden-Powell monoplane	Barking
F. S. Barnwell	Monoplane	Stirling
J. Baldwin*	McCurdy biplane	Nova Scotia
S. F. Cody*	Cody biplane	
G. B. Cockburn*	Biplane	Salisbury Plain
W. E. Cooke	Monoplane	Burnley
W. Defries*	Wright biplane	Sydney
Capt. J. W. Dunne*	Biplane	Shellbeach
Hon. Maurice Egerton*	Wright biplane	Shellbeach
W. Foulis	Wright biplane	Edinburgh
H. G. Ferguson	Ferguson monoplane	Lisburn, Ireland
A. E. George*	Voisin biplane	Shellbeach
P. Grace*	Short biplane	Shellbeach
A. L. Guinness*	Antoinette monoplane	Mourmelon
B. E. Harkness*	Antoinette monoplane	Mourmelon
G. Higginsbotham	Blériot monoplane	Fresfield
Pro. A. K. Huntington	Voisin biplane	Shellbeach
Ballin Hinde*	Blériot monoplane	Coventry
J. Humphreys	Humphrey's monoplane	Wyvenhoe
J. H. Jones	Blériot monoplane	Adelaide
J. Kimmerling	Voisin biplane	South Africa
H. C. Lobnitz	Biplane	Cowes
G. Laking*	Laking monoplane	Clacton-on-Sea
Capt. E. M. Maitland	Voisin biplane	Brooklands
Capt. Mackworth	Biplane	Shorncliffe
Sir Hiram Maxim	Maxim biplane	Crayford
W. Moreing	Voisin biplane	Dagenham
F. McClean*	Wright biplane	Shellbeach
G. J. Mason	Monoplane	Hanwell
W. O. Manning*	Howard-Wright biplane	Rye
R. F. Macfie*	Monoplane	Foulness I., Essex
J. T. C. Moore-Brabazon*	Short biplane	Shellbeach
J. D. McCurdy*	McCurdy biplane	Nova Scotia
A. J. Milne-Wilson*	Blériot monoplane	Pau
J. V. Neale*	Neale monoplane	Brooklands
A. Ogilvie*	Wright biplane	Rye
G. W. Parkinson*	Blériot monoplane	Newcastle
H. Pickersgill*	Pickersgill monoplane	Keighley
C. Pride	Monoplane	Bristol
M. H. Fentum Phillips	Helicopter aeroplane	Guildford
A. V. Roe*	Roe triplane	Wembley
Hon. C. S. Rolls*	Wright biplane	Shellbeach
A. Rawlinson*	Farman biplane	Mourmelon
H. Deverall Saul	Saul quadruplane	Barking
Capt. H. A. Sanders	Biplane	Benacre, Suffolk
H. P. Saunderson	Monoplane	Elstow, Beds.
A. M. Singer*	Farman biplane	Mourmelon
Arthur Smyth	Biplane	Eastbourne
Somers Somerset*	Antoinette monoplane	Mourmelon
Rev. Sidney Swann	Monoplane	Ravensworth
W. Stirling	Spencer-Stirling monoplane	Brooklands

Crosland Taylor	Monoplane	Helsby, Chester
C. Grahame-White*	Blériot monoplane	Pau
Duke of Westminster*	Antoinette monoplane Farman biplane	Mourmelon
Capt. Windham	Blériot monoplane	Wembley

J. Lumb had a monoplane of his own design; E. Saunderson, the Saunderson monoplane; W. A. Seymour, a Voisin biplane; Harry Simpson, a Voisin biplane; José Weiss, the Weiss monoplane; A. G. Creese, the Creese-Diderich monoplane; and Gratze, the Gratze monoplane. There were Sir George Abercromby at Brooklands, Lieutenant Cochrane at Portsmouth, Captain Carden at Farnborough, N. A. Feary, A. M. Grose, E. M. Ling, E. Pitman, Lieutenant A. D. Stocks at Portsmouth, A. Watson in Perthshire and H. K. Hales at Burslem.

Lieutenant H. Watkins was coming on rapidly as a pilot. I wrote at the time: " The new Howard Wright biplane which Lieutenant Watkins is using differs from the machine exhibited at Olympia. The makers claim that it is structurally very strong, being made almost entirely of Honduras mahogany. Its dimensions are as follows: area, 500 square feet; span, 36 feet; length, 37 feet; weight with pilot and fuel for seven hours, 1,500 lbs. The machine has a monoplane tail, flap ailerons, and a control similar to that of the Farman. This is the machine on which Captain Maitland had his accident. Captain Maitland, by the way, now walks quite well, with slight aid from a stick.

" Mr. Howard Wright has also modified his monoplane which, in the hands of Mr. Sopwith, has been doing quite remarkable things at Brooklands. But Mr. Sopwith is a phenomenon. His progress has been incredibly swift; no sooner had he got off the ground for the first time than he essayed, and accomplished, the most daring turns in the air, wheeling with all the assurance and effect of a Morane. There appeared to be a large element of recklessness and luck in the performance, and when he skimmed within 10 feet of the sheds it was considered that he was going ahead somewhat thoughtlessly."

I have unearthed the following complaint:

" The last few days have provided gratifying evidence of the fact that there is no inherent incapacity for flight in the constitution of the Briton. Mr. A. Rawlinson is known all over the world as having been one of the most dashing beginners at flight on record. He has flown at Barking under conditions that would have struck a chill into the hearts of many more experienced fliers, while his plucky challenge to Mr. Moore-

Brabazon has given quite a lively stimulus to the subject of aviation. Mr. Grahame-White, by flying for sixty-five minutes, at Mourmelon, has jumped into the leading company of the army of flyers. And a number of good flights at Eastchurch inspire confidence. There is, of course, another side to the picture in this country, as, doubtless, there is in other countries. One was struck at the scarcity of enthusiasm among the few aviators who took the field at Brooklands last Monday. For five hours in the morning the conditions were perfect. There was not a breath of wind; yet no one was out. The aviators began to assemble when the Bank Holiday crowd came in. This is not the way things are done in France, where, at Mourmelon, for instance, the sun when it gets up finds fliers, teachers, and pupils, ready and eager. It may be said that no opportunity provided by the weather in France is wasted. It is very different in England, where, with a smaller proportion of windless days and considerable leeway in flying practice to make up, only a very few of our men exhibit any enthusiasm."

The complaint was, perhaps, a little unfair, although there was an element of truth in it. As will have been gathered, serious work was being done in this country. Among the men who had been to the Rheims meeting, and had learned to fly, were Mr. (now Brigadier-General) J. G. Weir, C.M.G., C.B.E., the brother of Lord Weir of Eastwood. His " ticket " is number twenty-four on the British list, and it was taken in 1910. At Blackpool, Rouen, and Lanark, he had passenger flights, which was a very different thing in those days to what it is now. M. Blériot taught him to fly on a 25 h.p. Anzani-Blériot, and he afterwards bought a 50 h.p. Gnome-Blériot, and also a second of the same type, which was sent to Persia to assist in the survey of the pipe line from the oil-fields to the coast. Mr. Weir joined the Royal Flying Corps Reserve, and was appointed to go through the prescribed course of instruction early in 1914, and when the war broke out he was automatically mobilised with the Territorial Artillery; but in October the authorities attached him to the Royal Flying Corps at Farnborough as instructor and experimental officer. He was still flying after the war.

I find a record of its return in September, 1910, from its first camp of the London Balloon Company of Territorials, at whose Mess at Westminster I have spent more than one happy evening. The Company was then sixty-two strong. Most of its members were working engineers, mechanics, draughtsmen, or clerks. Captain King, of the R.E., and Mr. S. F. Cody worked hard in the interests of this band of enthusiasts, who had balloon and kite ascents, and did much practical work. A son of Dr. Barton, of airship fame, then employed at the Balloon Factory at Farnborough, gave instruction, and another source of strength to the Company was Mr. (now Wing-Commander) T. O'B. Hubbard. Of all their experiences the men were most delighted with kite ascents, and some of them went up as high as 1,500 feet on the Cody type of kite. Sometimes the ground party received shocks of static electricity through the kite cable, and on one occasion an accident was caused by a kitist pulling the wrong line, with the result that the kite descended at too rapid a pace and he received slight injuries to the head.

By the end of 1910 the Gold Medal of the Royal Aero Club had been presented to Wilbur and Orville Wright, M. Louis Blériot, M. Henry Farman, Mr. Hubert Latham, and the Hon. C. S. Rolls.

The following were the first aviator certificates issued by the British Club.

1	J. T. C. Moore-Brabazon	March	8	1910
2	Hon. C. S. Rolls	,,	8	,,
3	A. Rawlinson	April	5	,,
4	Cecil Grace	,,	26	,,
5	G. B. Cockburn	,,	26	,,
6	C. Grahame-White	,,	26	,,
7	A. Ogilvie	May	24	,,
8	A. M. Singer	,,	31	,,
9	S. F. Cody	June	7	,,
10	Lieut. L. D. L. Gibbs, R.F.A.	,,	7	,,
11	Hon. Maurice Egerton	,,	14	,,
12	James Radley	,,	14	,,
13	Hon. Alan Boyle	,,	14	,,
14	J. Armstrong Drexel	,,	21	,,
15	G. C. Colmore	,,	21	,,
16	G. A. Barnes	,,	21	,,

In addition, Captain Bertram Dickson, Mr. W. E. McArdle, and Mr. D. Graham Gilmour had taken French certificates, whilst some of the holders of the British certificates also held the French one. In either case, of course, the certificate was that of the International Federation.

CHAPTER X

MY NOTEBOOK—II

THERE were in 1910 no fewer than 350 flights of over an hour. Of these seventy-six exceeded two hours, twenty exceeded three hours, three exceeded four hours, two exceeded five hours, and one exceeded six hours; 120 were cross-country flights, twenty-one of them being flights of over two hours, and five lasting more than three hours. A large number of these flights were with passengers. During the year there were fifty-two aviation meetings. It is probable that in 1910 from 80,000 to 90,000 miles were flown. It was reckoned there was one fatality to every 3,600 miles, but all such estimates in those days were untrustworthy.

AVIATION FATALITIES IN 1910

Delagrange, at Bordeaux, January 4.
Leblon, at San Sebastian, April 2.
Hauvette-Michelin, at Lyons, May 13.
Robl, at Stettin, June 18.
Wachter, at Rheims, July 3.
Kinet, at Ghent, July 15 (died from injuries).
Rolls, at Bournemouth, July 12.
Kinet, at Liège, August 3.
Vivaldi, at Rome, August 20.
Van Maasdyk, at Arnheim, August 27.
Poillot, at Chartres, September 25.
Chavez, at Domodossola, died September 27, from injuries in landing after his trans-Alpine flight of September 23.
Haas, at Metz, October 1.
Plochmann, at Habsheim, September 28.
Matsievitch, at St. Petersburg, October 7.
Madiot, at Douai, October 24.
Blanchard, at Issy, October 26.
Saglietti, at Rome, October 27.
Johnstone, at Denver, November 17.
Cammarato, at Centocelli, December 3.
Castellani, at Centocelli, December 3.
Grace, December 22.

The death of Hauvette-Michelin was really caused by a flagstaff falling on his head while he was on the ground; Blanchard completely lost his presence of mind and took no trouble to avert an accident when he might really have saved the situation; and Johnstone was attempting an absurdly foolhardy feat, thereby exhibiting want of judgment and a complete lack of appreciation of the principles on which the science of flight is based. Many of the other accidents were caused by the collapse of the machine in the air.

There was a great deal of concern at the number of flying fatalities, and an International Safety Devices Committee, on which the Aerial Leagues of Britain, France, and Belgium were represented, was formed. The Committee first met at Folkestone at the Town Hall, and Mr. Rudyard Kipling was voted to the chair. That meeting was uncommonly interesting on account of the opportunities it afforded for meeting men famous in aeronautics. There was M. Ernest Archdeacon, one of the most remarkable men I have ever met, his mind ever groping forward to discoveries and inventions, many of which have been fulfilled. But, at the same time, he was one of the most liberal French patrons of flying, offering prize after prize, and assisting inventors. He was doing practical work with gliders as long ago as 1905, and he made important contributions to the data then slowly accumulating. M. Louis Bréguet, who became one of the foremost designers and manufacturers of aeroplanes, was always ready to discusss matters. There I met Sir Charles Wakefield, afterwards Lord Mayor of London, and to whom aviation has owed so much, a debt which is ever increasing. Sir Charles was in it from the first, and he has given prizes just where they were calculated to do the greatest possible good. Then there were old General Arbuthnot and Colonel H. S. Massy, the moving spirits of the Aerial League (now the Air League of the British Empire).

In his opening address, Mr. Kipling said recent events had sadly taught them that the question of inventing safety clothing for the aviators was one of the utmost importance, but it was one on which few people could pronounce an opinion with any authority, because we were like other people, moving about in worlds not realised. We were making conditions for a game which we did not understand, and everything that we were doing must in the nature of things be extremely tentative. M. Renè Quinton mentioned that the French League had offered a prize of 20,000 fr. for a perfect and reliable motor, Col. Massy adding that the English League had offered 25,000 fr. for a motor. I urged the desirability of offering a prize for an instrument to show an aviator that his machine was tilting up or down, and to what extent, and a resolution to this effect was adopted. The conference discussed the proposal that

Folkestone and Boulogne should offer a £2,000 prize to the first aviator who made the journey across Channel on four consecutive days, or four times in the same week, with one or two passengers, the machine to be one which could alight and float on the water. Boulogne guaranteed £1,000, and the Mayor of Folkestone said that a public meeting would be called to start a guarantee fund in that town.

One of the most interesting subjects came up informally after the conference. This was M. Renè Quinton's system of locality identification for the guidance of airmen. M. Quinton proposed to divide each country into kilomètre squares, and he showed a map of France ruled on this system. The squares were numbered from a central point, (which in France was shown as Paris) designated as zero, and both longitudinally and latitudinally. Each kilomètre square had two numbers, and a glance at these and reference to the key map would indicate to an aviator any particular kilomètre square in France.

MEMBERS OF THE CONFERENCE

- Sir Alfred Keogh, K.C.B., M.D., Rector, Imperial College of Science and Technology.
- General H. T. Arbuthnot, C.B., R.A.
- Captain Bertram Dickson
- Mr. J. T. C. Moore-Brabazon.
- Mr. Rudyard Kipling.
- Sir Charles Wakefield.
- Mr. Walter Emden, Mayor of Dover.
- Colonel H. S. Massy, C.B., Vice-President, Aerial League.
- Mr. E. S. M. Peronne, Vice-President, International Legal Committee of Aviation.
- Major F. Lindsay Lloyd.
- Mr. S. A. Marples.
- Mr. Charles C. Turner.
- Mons. Charles Peron, Mayor of Boulogne.
- M. Rene Quinton, President, Ligue Nationale Aérienne of France.
- M. Paul Doumer, Late President of the Chambre of Députés. Late Governor General of Indo-China.
- M. Louis Dausset, Member of the Conseil Municipal of Paris.
- M. Ernest Archdeacon, Vice-President of the Ligue Nationale Aérienne.
- M. J. Carpentier, Member of the Institute of France. President Technical Committee, Ligue Nationale Aérienne.
- M. Louis Bréguet.
- M. Adh. de la Hault, Vice-President of the Ligue Aérienne de Belgique.
- M. le Baron von Zuylen von Nyvelt, Secretary of the Ligue Aérienne de Belgique.

The public had but the haziest idea of flying at this period, and were ready to believe almost any tale. It had been reported that at Halifax Mr. Grahame-White had flown in a twenty to thirty miles per hour wind, and when he was announced to give a demonstration from the grounds of the Crystal Palace in June, 1910, few of the eager crowd imagined that anything short of a gale would prevent the flight, nor could they realise that the grounds of the Crystal Palace are too small, and unsuitably situated for flying. This should have been explained beforehand, for few pilots would have cared to fly there even in calm weather. For over two hours some ten thousand people had been waiting for the fulfilment of the promise held out in the posters: "Mr. Grahame-White will fly on Tuesday, June 14, from 5.30 p.m. to 8 p.m." At a quarter past seven an official, addressing the crowd from the spot where the biplane stood, explained that the aviator thought the wind too strong at that moment to attempt a flight, but he hoped that later in the evening he would be able to make a start. The spectators accepted the explanation with admirable good humour, although it seemed to them there was little or no wind blowing. Yet Mr. Grahame-White showed no signs of mounting his machine. Instead, he took a stroll round the grounds, while his photograph was being sold to the crowd. At a stall near his machine, one read the notice, "Passenger Flights Booked Here."

At a quarter to eight again an official conveyed to the disappointed and now impatient crowd that Mr. Grahame-White had been to the top of one of the towers of the Palace and ascertained that the wind was so violent that it would be dangerous to attempt any flight. The spectators then began hooting and booing; and thereupon the official announced that, to compensate them for the disappointment, they would be given free seats in the evening at the display, "The Destruction of Pompeii." The announcement was the signal for renewed demonstrations. "We don't want your fireworks," they shouted; "we came here to see a flying machine. If you can't fly, give us back our money." Fortunately, at this juncture Colonel H. S. Massy, of the Aerial League, appeared on the scene, and announced that the yellow pass-out tickets to the League enclosure would re-admit the holders to the same place the following Tuesday, when Mr. Grahame-White might be able to fly.

He flew on the next Tuesday, and on the day after by flying from the Crystal Palace to Brooklands he again proved that he was an accomplished and plucky flyer.

I was in correspondence about this time with the late F. Hatton Turnor, the author of *Astra Castra*, a remarkable compendium of aeronautical literature selected from all ages and all countries. It is a quarto, published in 1865, and one of my most treasured possessions is an autographed copy from the author. Hatton Turnor was in correspondence with Count Von Zeppelin, to whom he had sent one of my books, and I possess the German airship pioneer's letter of acknowledgment. I visited Hatton Turnor at Bournemouth.

One inevitably collects a large number of autographs, souvenirs, and the like, but in those years I did not fully realise that one day they would be valuable: I kept few except those which had a real personal interest. But I have preserved some of the earliest aviation catalogues and posters.

Great interest was aroused at the end of 1910 by the contest for the De Forest prize of £4,000 for the longest flight, starting in England and ending in another country. One of the favourites was Lieut. Hugh Watkins, who was to use the Howard Wright—E.N.V.—belonging to Captain E. M. Maitland, who was still *hors de combat* from his accident. In this attempt wireless was to be used, and the apparatus was supplied by the Marconi Company. The idea was that Captain Maitland, following the flight in a tug, should be in communication with Lieut. Watkins in the air.

The apparatus weighed 30 lbs., and consisted of an automatic transmitter packed in a square box placed under the pilot's seat. To this two sets of aerial wires were connected forward on to the elevator, and from the elevator back to the extremities of both main planes, and from thence to the tail of the machine. A receiving apparatus tuned to the same wave-length as that on the flying machine itself was to be erected on the accompanying tugboat, and, owing to such a large length of aerial wire being carried on the aeroplane, it was expected that messages would be clearly heard up to a distance of about twenty miles. But for some reason, probably that Mr. Sopwith won the prize, the flight was not made.

Mr. Sopwith, who was all but a novice, having had only a few months' flying experience, flew a Howard Wright biplane fitted with a 50 h.p. E.N.V. As already related, he started from Eastchurch, Sheppey, at 8.30 a.m. on Sunday, December 18, with twenty gallons of petrol, which it was calculated would last seven hours. Rising to a height of 1,000 feet he headed for Dover. Soon after 9 a.m. he was sighted on the Dover-Folkestone coast line, travelling at an estimated speed of fifty miles an hour and heading for Calais. From that time until 2.30 p.m. he was lost. Then a telegram from the aviator to his sister at Dover announced that he had descended at Beaumont, in Hainault, Belgium, at a point about 177 miles from Eastchurch. It transpired that after crossing the Channel in twenty-two minutes Mr. Sopwith lost his bearings. He had eleven gallons of fuel left, and was not greatly fatigued; but the weather was threatening, and he landed, after being in the air about three and a half hours. On the same machine he made at Brooklands a British record by flying for three hours thirteen minutes on a British-made aeroplane with a British engine, October, 1910.

When Mr. Sopwith made his successful flight for the De Forest prize, many thought his best would be surpassed by other competitors, notably Mr. Grahame-White and Mr. Cecil Grace. The former failed through an accident early on the same day. Mr. Grace set out from Eastchurch on December 21, and stopped at Dover. The next morning he ascended again and crossed to Les Baraques. He intended to return to England preparatory to another attempt. As the Channel had been foggy he tried to obtain the help of the Calais-Dover steamboat as a guide, the boat to start about twenty minutes before he did, so that its smoke would serve as an indication of the direction of the wind, The boat was delayed however, and the aviator risked starting, without any guidance, at about two o'clock. He was never seen again. He took thirty gallons of petrol on board at Les Baraques, enough for about seven hours' flight. He had a compass, but that, of course, is useless without knowledge of the strength of the wind, or unless in sight of landmarks. It can hardly be doubted that he went too much to the east and missed the corner of the Kentish coast altogether. Cecil Grace was one of the greatest supporters of aviation in Great Britain, and his disappearance, coupled with the death of the Hon. C. S. Rolls, a few months before, robbed this country in one year of two of its foremost amateur flyers. But Great Britain had a few points to the good. The Gordon Bennett race, flown in America, had been won by Mr. Grahame-White who, however, flew an all-French Blériot monoplane. But he beat the great French flyer, Leblanc, who had to land in the 20th lap, quite possibly as a result of forcing his engine unwisely.

Naturally all sorts of people who lacked scientific or engineering knowledge were attracted to aviation, and sometimes they were betrayed into indiscretions. Thus the late W. T. Stead came on the scenes. He was a spiritualist, and he said he had communicated with the spirits of the departed. He claimed he had had a conversation with Lefebvre, an aviator who had recently been killed. The members of "Julia's Bureau" used to meet every morning to confer with their directress, who, visible to the "clairvoyant", occupied the presidential chair. After having received two brief messages from Julia the medium said: "I hear another voice speaking."

I now quote the following notes taken down in the secretary's note-book:

"If you go to Châlons I go with you."

Mr. Stead: "Who is it who speaks?"

The Medium: "I have been dead some time. My name is Lefebvre."

"Strange as it may seem," Mr. Stead afterwards related, "this name awoke no memory in me. I was abroad when Lefebvre was killed, and I thought this might be someone who died a long while ago. None of those present recognised the name."

On the following day the spirit again spoke and the following communication was reported.

Mr. Stead: "Ask Lefebvre if he is the man who was killed in an aeroplane accident?"

"Yes. I thought you knew it."

Mr. Stead: "You can communicate directly with me. Do you speak English?

"No, not much; but I transmit my thoughts to the medium, and he translates them into English."

Mr. Stead: "What was it caused your rapid fall?"

"I did not have time to think. You scarcely have time to reflect when you fall."

Mr. Stead: "In your unexpected fall did you keep your presence of mind?"

"This is what I felt: I was conscious that I was falling, but before touching the ground I had lost consciousness. I felt no pain nor any sensation in my physical body. It seemed to me that my spirit was projected out of it. I had a sensation of rapid rotation, then something gave way suddenly, and I found myself in the air, seeing beneath me my mortal remains and the machine. It was not disagreeable. I observed, too, that a being who was very powerful, and who calmed me, was near, and to-morrow this same being will try to write by your hand when you are at Châlons."

Lefebvre asked Stead to warn Bolotoff, another aviator, at Châlons, that his motor would not work properly.

Mr. Stead went to Châlons on the following Monday and warned M. Bolotoff of Lefebvre's advice. The motor was treated with extreme care, and seemed in the most perfect order until M. Bolotoff took his seat in his aeroplane. Then the motor would not work, the starting handle broke, and the experiments had to be abandoned. (But such experiences with motors were common in those days, and need no spiritualistic explanation).

Although lacking knowledge of aviation and of the technique and science of flight, Stead made a great to-do about Prince Bolotoff's aeroplane and announced, "the aeroplane is likely to make the name of Bolotoff famous throughout the world. This machine, which is entered for the cross-Channel competition, differs from all other aeroplanes in having three planes instead of two, and in that it is driven by a motor engine of 100 nominal h.p. The difficulty with most of the aeroplanes is that the light motors used can never be relied upon for a long continuous run. The engine which is mounted upon the Bolotoff aeroplane is a 100 h.p. Panhard, which, before it was dedicated to aerial service, ran without a hitch or a stoppage, other than those necessitated for taking in fresh supplies of petrol, for two 800-mile runs along the public road. It is also identical with the motor used on the boat which won all the prizes last year at Monaco.

"One of the many disadvantages of the Wright aeroplane is that it cannot start from anywhere or descend anywhere. The Bolotoff aeroplane can start from any smooth open space from which it can get a hundred yards run, and in the same way it can descend where it pleases."

I will leave W. T. Stead to the Editor of the *Automotor* journal, who wrote a letter to the press, in the course of which he said:

> " It is, we feel, only due to the future prospects of aeronautics as a great coming industry that a strong protest should be raised against Mr. W. T. Stead's amazing—and in many respects inaccurate—article headed ' Wright Brothers' Rival.'
>
> " Statements such as those contained therein concerning an untried invention are, we contend, not only quite unjustifiable from the pen of any writer, but are liable to do an incalculable amount of harm owing to their misleading character. Considering that no scientist, however high his standing in the world, nor any living student of aeronautics could foretell to-day with certainty whether Prince Serge de Bolotoff's invention will prove a success or be a failure, we are amazed that Mr. Stead should speak of it in the definite terms he uses. It is clear from the article itself that the statements to which that writer commits himself are based on nothing more substantial than the claims of this twenty-one-year-old inventor, who, it is admitted, ' never

had any technical engineering education,' and on the behaviour of a model."

It was unfortunate that the ill-informed enthusiast should so often have overshadowed the real pioneers, who in many cases shunned rather than sought publicity. May I recall a few of the men who were consistently following the legitimate track, painfully and dangerously?

Captain Bertram Dickson was one of our best flyers, representing this country at meetings on the Continent, and often proving better than the best of the Frenchmen. At the Rouen meeting of June, 1910, he headed the list of prize-winners, beating Morane, Latham, Cattaneo, Efimoff, and others. At Tours he took nearly all the prizes, flying for three hours in a high wind when the other machines were in their hangars. The vol plané, or glide, was his speciality, and his display at Tours brought him invitations to fly for big fees.

Captain Dickson had been Military Consul at Van, on the Persian frontier, before he learned to fly. He took his "ticket" on a Farman, in France, in April, 1910, and he had a short and brilliant flying career. A queer story is told about his accident at the Milan meeting. With his sister he had visited the British Museum and examined there the mummy of the Priestess of Amen Ra, which is said to bring ill-fortune to all who come in contact with it. Miss Dickson was shipwrecked within six weeks on the Albanian coast, and although she was saved her experiences were extremely trying. Her brother while flying at Milan collided with M. Thomas, who was on an Antoinette. He was badly injured, and while he was in hospital the bank which had charge of his money failed and he was brought to the brink of ruin. Then the court of inquiry held him responsible for the accident because he was making an exhibition flight, whereas M. Thomas was taking part in a competition, and he was ordered to pay £600.

He did not fly again until March, 1912, and then he became associated with the Bristol Aeroplane Company. His constitution, however, had received a severe shock, and he died on September 28, 1913.

Mr. Armstrong Drexel early in 1910 became an aviator, and in a very little while beat the British height record by flying to 1,100 feet over the New Forest. M. Louis Paulhan had been the previous best in this country. A wealthy man, Mr. Drexel financed a flying school near Beaulieu in co-operation with Mr. McArdle of Bournemouth.

At the beginning of 1910 there was not a single certificated

British pilot. In a few months, however, the following received their certificates in addition to the list at the end of the last chapter: A. V. Roe, Captain G. W. Dawes, A. E. George, H. G. Melly, H. J. Harding, E. Archer, R. Wickham, F. K. McClean, Waldemar-Smith, Keith Davies, Captain C. J. Burke, C. R. d'Esterre, Lieutenant H. Watkins, E. A. Paul, J. D. Weir, C. H. Greswell, Captain J. B. Fulton, L. F. McDonald, Lieutenant R. T. Snowden-Smith, H. Barber, T. O. M. Sopwith, J. J. Hammond, Archibald Low, Sydney E. Smith, Captain A. G. Board, R. C. Fenwick, Captain H. F. Wood.

In France there were about 300 certificated pilots. French aviators won upwards of £100,000 in prize money in 1910. In 1911 twice as much money was awarded to aviators as in 1910, and there were quite a lot of aviation meetings in spite of the fact that anyone could see cross-country flying without paying. Of the prize-winners, the principal ones were Lieutenant J. Conneau ("Beaumont") (about £20,500), Védrines (about £8,000), Sopwith (about £4,000), Garros, Gibert, Rodgers, and Beachey.

Mr. Graham Gilmour early in 1911 was touring on his Bristol military biplane. On April 12, with Mr. Gordon England as passenger, he set out from Amesbury for Yeovil. He lost his way, however, and descended at Fryern Court, near Templecombe. Reascending, he flew to Blandford to a friend's place, and Eastbury Park. In the evening he headed for Martock, but the wind was so strong that he was practically blown down at Henstridge station, where the airmen rested for the night. Continuing in the morning, they flew to Martock, via Sherborne, where they made some passenger flights, winding up by a descent on a lawn, which involved a fence in ruin but left the aeroplane practically undamaged.

Gliding experiments were much discussed at this period, and in America the Wright Brothers resumed their work in the light of experience gained with their power machine. They desired to discover the extent to which motorless flights were possible. Very soon they succeeded with a flight of more than fourteen minutes' duration. I wrote in the *Field* at the time: "Lilienthal clearly saw the way to longer flights than any he made, besides telling us that horizontal flight could be maintained with comparatively small motors. It is likely, too, that new light that is being thrown on the soaring flight of birds may help us. But what the Wright Brothers' experiments are chiefly useful for is their indication of the way to such refinement of the machine as will make low-power flight possible. The brothers are, at the same time, credited with the invention of an automatic stability contrivance; and perhaps they realise that if they are going to show the world how mechanical flight may be made cheap enough for the indulgence of large numbers of people it will be very necessary to construct ‘foolproof’ machines. On general grounds I should prefer a machine in which the pilot did most of the stabilising rather than any automatic balancing machine, and I think that most aviators would agree with me—I mean, of course, until the really perfect automatic balancer is made. Natural stability is another matter altogether; to some extent this can be obtained by the proper shaping of the wings, as in the Dunne, the Etrich, and the MacFie aeroplanes. But all machines ought to have a large measure of natural stability. When it comes to using devices which automatically work ailerons and the flexible wing tips, one feels that one would like to have the control levers ready and effectual for use in emergency."

Mr. E. W. Twining was an authority on gliding, and I take the liberty of quoting the following letter he sent to me:

> " Most of the gliders which are built, generally by two or three young fellows who have clubbed together, are tried a few times on unsuitable ground or in unsuitable winds, broken up, and consigned to the scrap heap.
>
> " I feel quite sure that there are many gliders built of hopelessly bad design, and oftentimes, too, of bad workmanship. There seems to be a great liking for monoplane gliders, designed on the lines of Blériot, Antoinette, or Demoiselle machines. The builders of these contraptions get them out in a ten-or fifteen-mile-an-hour wind and expect to be able to glide, overlooking the fact that they have not enough surface by about half.
>
> " I am afraid that notwithstanding the possibly large number of gliders built, there has been very little useful and good gliding done in this country. The chief difficulty is undoubtedly the want of suitable grounds, another is, so far as my experience goes, that those who are most enthusiastic are not blessed with the wherewithal to hire ground or sheds, although they may manage to scrape enough together to build their glider.
>
> " I feel sure if a good ground could be found close to or within easy distance of London a club could be formed amongst those who have gliders or are contemplating building one. The doings of the Wright Brothers will undoubtedly cause a revival in the popularity of the sport."

I came across numerous instances of boys going in for gliding experiments, either with machines bought complete, or, more generally, with machines made at home with materials costing anything between £3 and £10. It is probable there were from 100 to 150 gliders in full swing. Mr. T. W. K. Clarke, who built Mr. Ogilvie's first glider, says there was a considerable sale of material of this kind, but that in many cases the machines constructed failed to glide. Some Dulwich schoolboys made a glider for £3, and with it they were in the habit of making flights of sixty yards, and would in a more favourable position have got a greater distance. One of them was Mr. N. Comper, who afterwards joined the Air Service, remained in it after the War, designed and with the aid of the members of the Cranwell Light Aeroplane Club built a light aeroplane and flew it with great success at flying meetings.

The Kite Flying Association brought together another class of enthusiasts and its secretary, Mr. W. H. Akehurst, was a good worker in the cause.

About this time there was legal trouble over the Wright Brothers' warping device by which the corners of the main planes were bent to obtain stability. Light was thrown on the matter in an address by Professor J. J. Montgomery, at New York, on his early experiments with gliders. "Mr. Chanute" (he was referring to the famous aeronautical experimenter) "is a patriot," said Professor Montgomery, "and I remember well the words he said to me in 1893. I had developed this principle of warping. I was rather slow in making it known to Mr. Chanute. I gave him to understand that I had developed certain ideas regarding equilibrium that I wished to patent. Then Mr. Chanute said to me he did not believe anyone should take out patents on any devices, because this was a problem of humanity. No one man was going to solve it. All should lend their work to the solution of this great problem, and anyone taking out patents might interfere with the progress of the science. When Mr. Chanute expressed himself that way to me I saw the full truth of what he said and appreciated it. Then for the first time I made known to him the device by which I controlled the lateral equilibrium, i.e. by warping."

Professor Montgomery was the experimenter who many years ago sent up a glider with a balloon in order that a glide from a great altitude might be made. His assistant, Maloney, made some remarkable descents from altitudes up to 3,000 feet. He was killed in his last experiment, and it was generally believed that he was dashed to pieces owing to the glider being broken at the moment it was cut adrift from the balloon. The usually reliable *Pocket Book of Aeronautics* by Lieut.-Colonel Moedebeck, states that he was killed by the fall. It is, therefore, astonishing to hear from Professor Montgomery's own lips that, although Maloney's glider turned upside down, it did not descend any faster than a parachute. Physicians examined the aeronaut, but found no mark on him except a scratch on the head from a wire. No bones were broken, nor was any blood shed. The physicians concluded that Maloney died from heart disease in the air.

The youngest certificated aviator in England was Midshipman N. F. Wheeler, aged fifteen, who took his certificate at the Bristol Salisbury Plain School in December, 1912. After leaving training college the young cadet joined the Bristol school and got his "ticket" in four weeks. Naval-cadet Robinson, aged 14½ years, soon after learned to fly the Deperdussin monoplane at Brooklands. A French boy, Marcel Hanriot, learned to fly at the age of 14.

The only Gordon-Bennett Aviation Race held in Great Britain was that of 1911. Mr. Grahame-White had won the previous year's race in America, and, in accordance with the rules, the next contest had to be held in the country whose representative had been victorious. (The race is described in the Chapter on Eastchurch).

In that year, on the occasion of a strike, aeroplanes were used for urgent transport. Gustav Hamel had arranged to carry supplies of an evening paper to a badly served district, and Mr. Barber was willing to carry goods to Manchester. But without the incentive of a strike aeroplanes were used in conveying parcels of newspapers to a region inaccessible by the ordinary transport means. It had been found impossible to supply a Sunday newspaper on Sunday mornings to the military area near Salisbury. The Sunday newspapers that were obtainable were editions prepared on Friday or Saturday afternoon. Local trains did not fit in with the main line service in a way to enable a newspaper printed after midnight on Saturday to be delivered at Bulford Camp and other places within a few miles of Salisbury. Arrangements were made with the British aeroplane school at Amesbury for the transport of parcels through the air from Salisbury to Bulford every Sunday morning.

The first official aerial postal service in Europe started on Saturday, September 9, 1911, when letters were conveyed by aeroplanes from Hendon aerodrome to Windsor. The aerial post was carried out in strict accordance with the regulations of the postal service, subject to special conditions laid down by the Postmaster General. The net profits derived from the service were given to a public charity approved by the Postmaster General. It was originally intended that the aerial post should be in operation during the week of the Coronation of King George and the following week, but the Aerial Navigation Act, 1911, made the arrangement impossible.

The project was organised by Mr. D. Lewis-Poole and Captain Windham, of the honorary organising committee, who entered into a contract with the Postmaster General, by the terms of which they acted as "contractors", or carriers, for the aerial postal service. A contract was also entered into by Mr. D. Lewis-Poole, on behalf of the organisers, with Mr. Grahame-White for conveyance of the aerial mail from London to Windsor. The pilots engaged in the service signed the usual Post Office declaration which all mail carriers are required to sign.

Only the special pictorial postcards and envelopes issued by the committee, by sanction of the Postmaster General, were conveyed, and they had to be posted in special boxes. The postcards and envelopes, which bore a copyright design of Windsor Castle, printed in either brown, green, or red, were issued stamped: postcards, stamped for inland postage, price 6½*d.* each; envelopes, stamped for inland postage, price 1*s.* 1*d.* each. A correspondence card was enclosed in each envelope. Adhesive stamps had to be affixed to make up the fee required for postage abroad. Postcards and letters bore over the ordinary postage stamp a special postmark: "First United Kingdom Aerial Post," and the date. They were collected from the special boxes and conveyed to a central post office, and then taken to the aerodrome for conveyance by aeroplane.

A record trip was made by Hamel with the mails on Saturday, September 9, the official in charge of the Post Office staff at Hendon reporting as follows: "Mr. Hamel left Hendon at 4.58 and arrived at 5.8. The time occupied on the journey was, therefore, only ten minutes. The actual distance from Hendon to the place near the Royal Mausoleum, Frogmore, where Mr. Hamel alighted, is about twenty-one miles." This would mean a speed of 126 miles an hour, which, allowing for the known speed of the aeroplane in still weather, would indicate a wind equal to about fifty-six miles per hour.

On September 22, Hamel refused to continue his delivery of the aerial mail unless a cheque of £500 was handed over for the benefit of M. Charles Hubert, who had fallen and broken both thighs on the opening day of the service. Hamel afterwards continued the delivery, and it was stated that the committee had agreed to recommend that £500 of the net profits from the scheme should be presented to M. Hubert; and the £500 was duly sent to M. Hubert.

In August the Aero Club refused to sanction a proposed Shoreham-Dieppe flight. The amazing thing is that anyone—owners of aerodromes or conductors of popular watering places—should have gone to the trouble of organising such a competition without realising its dangers and, at any rate, without consulting experts.

Collyns Pizey had a thrilling experience while flying from Salisbury Plain to Brighton with a new Bristol military biplane for Mr. O. C. Morison. Shortly after rising into the air a thunderstorm broke with great fury, and Pizey had about the most awe-inspiring quarter of an hour ever experienced by airmen. Lightning played around the machine, and the noise of the thunder was deafening. Owing to the dense rain the airman was unable to see the earth, and it was not until the storm had abated that he was able to land. He completed his journey to Brighton, and delivered the machine to Mr. Morison.

I also find the following note: "James Mars is back in London after a tour in the Far East to introduce the flying machine, and he has much of interest to relate. 'The greatest mark of favour which I received,' he says, 'was in Korea, where the King sent me an elephant. It was an embarrassment of riches. I gave it to a girl, and told her to be good to it. One striking honour conferred on me was the decoration which allows me six wives and perpetual immunity from working. It was given to me by the chief of the Moros in the Philippines, and there was nothing throughout our tour to equal the feasting on that occasion'."

But for some reason the authorities in India regarded the subject of aeronautics as undesirable for the native mind. Colonel H. S. Massy, C.B., went to India for the purpose of extending the patriotic work of the Aerial League there, and arranged to give lectures in the native provinces. He was, however, requested by the authorities not to do this. On the other hand, a private aircraft firm, the Bristol Company, did much in the course of trying to open up a market for their machines.

At army manœuvres in India M. (now Major) Henri M. Jullerot made a cross-country flight of fifteen miles at a height of 1,200 feet over dense jungle country. Capt. (now Air Vice-Marshal Sir) W. S. Brancker was taken up as military observer for two long flights.

The Bristol firm's representative, Mr. J. J. Hammond, also made a flight at Melbourne, attaining a height of 2,000 feet and flying for twenty miles. He also flew from Melbourne to Geelong. Mr. J. J. Hammond is a New Zealander. He learned to fly in the Sanchez Besa biplane, and was for some time helping Mr. Fowler at Eastbourne aerodrome and flying school.

I cannot do better than quote from my article on Major Jullerot, which was published in *Aeronautics* in June, 1920.

Major Jullerot hails from French Alsace, and comes of soldier stock. He would have been a professional soldier but for his love of travel, of languages, and of the wider human interests. He was at different times engaged in the shipping, banking and engineering industries.

He had a flight with Lefebvre on a Wright biplane in 1908, and in the next year was flying a Farman biplane and then a Pischoff "parasol" monoplane. His is the sixty-first "ticket" issued by the French Aero Club, about the same date as Mr. Grahame-White's No. 6 on the British list. Major Jullerot flew in many of the early Continental meetings.

In India, in 1910, at the request of Sir Douglas (now Earl) Haig, he made the first aerial reconnaissance for the British army.

When the Great War broke out, Major Jullerot hurried to France, and was with the French infantry in the great retreat, and in the battle of the Marne. But what a waste of flying knowledge and talent! The late Air-Commodore Groves, one of the finest officers our Air Service ever had, secured Major Jullerot's transference to this country, and the R.N.A.S., and he served at Dunkirk and Dover, and afterwards on the instructional side with myself. Then he became liaison officer in the anti-submarine service. After the War he joined Vickers.

I wrote in the *Field* in June, 1911:

"The English are a hero-worshipping nation, the latest evidence of this fact being the glorification of the individual flying man. Take the crowd at Brooklands or at Hendon on any day, and it may be observed that they give all their attention to the prowess shown by flyers, and spare not a thought for the students and experimenters who have designed and produced the machines. In England, the names of the big flying men are everything, but no one ever thinks about the pioneers. Blériot is popular because he flew across the Channel, a very much smaller achievement than his heroic struggles with his early machines. Wilbur Wright, if he flew publicly in England, would have to turn somersaults in the air before he could get what they call in theatrical circles 'a hand'. And who in

England cares a rap about Lawrence Hargrave, Glenn Curtiss, or the designer of the beautiful Antoinette monoplane? Even Cody is never given credit for his long battle with the kite, and the designing of his aeroplane; and if, during a flight, he fails to go up at least 1,000 feet, he is almost ridiculed! As for the French, while they praise daring and skill, they never lose sight of the designer of the machine. As far as this country is concerned, the evil effect of the hero-worshipping habit is that designers and inventors receive no encouragement. There are several men in this country to-day who have ideas that are languishing simply for want of a little financial support. The men who can obtain capital are not the men who have a sound scheme or have a good patent, but the men who can merely fly well. And at the back of all this, and the reason for it, is, I suppose, our extreme backwardness as a nation in technical and practical education, a deficiency for which we are now paying dearly, and shall, ere any remedy has time to bear fruit, pay very bitterly."

A few months after, in the *Observer*, I made the following notes, which recall the period:

"Nearly all the aerial touring in this country is being done by Englishmen on French machines—Mr. Hamel, Mr. Slack (who is preparing a tour for the International Correspondence Schools), and Mr. Hucks on Blériots; Mr. Sippe on a Hanriot; and Mr. Grahame-White on a Nieuport. The last named, it is true, also flies one of his own machines. On the other hand, it would probably be impossible to find anywhere a leading French pilot flying a British machine, although in one or two British flight schools French pilots are acting as teachers. The principal exception to the vogue of the French machine—and it is a notable one—is provided by the Bristol monoplane flown by Mr. Valentine. Great Britain can produce the machines and the men to fly them. The British industry is, however, competing with the State-aided and protected French industry, and a very uphill fight must be waged by manufacturers and the capitalists who are to provide the sinews of war.

"As to aerial touring in general, it has been said that the cost is the principal hindrance to a great and immediate development. If aviation could be brought within the means of the man with an income of £500 a year we should soon have plenty of aerial tourists. At the moment it is, perhaps, just as well that they are not more numerous; but, as a matter of fact, the cost is usually exaggerated. There is another adverse factor which must have a good deal of weight, and that is the discomfort in which flights are usually made—the uncertainty of the machine and the general untidiness of the paraphernalia of flying. This factor counts more with those who have not flown than with those who have; the latter are so fascinated with the experience that no mere discomfort can restrain them, and they are unhappy when unable to fly.

"The price of a machine, including the motor, may be anything from £400 to £1,200; and there is no longer any reason to look askance at the lower end of the scale. Unless the purchaser desire an aeroplane that will travel at a speed of over 60 m.p.h., with two up, he need not anticipate an initial outlay of more than £600 or £700; he can even do it on less. The cost of learning to fly, including insurance, is £75 at most of the schools.

"The price of a shed at Brooklands, which may be taken as a fair average ground, is £100 per annum. It is possible to economise in this respect. Mr. Cockburn possesses his own shed on Salisbury Plain, and pays, I believe, a small ground rent. Mr. Ogilvie for a long time had a shed on the sands at Camber, near Rye.

"The private owner of an aeroplane must have the services of a good mechanic, and he should also employ a boy. The combined wages of these servants will be £170 or £180 a year.

"The cost of flying as regards fuel and oil is easily reckoned. In the case of the most extravagant engine of 50 h.p. the consumption, perhaps, amounts to about 13*s*. per hour. Less extravagant and lower-powered engines mean economy.

"Accidents will happen even to skilful flyers, and bad landings are a thing to be reckoned with. These should be provided for in advance by a fund for the purpose; it is, indeed, already possible to insure against them. The principal thing to bear in mind at the moment is that the damage done to aeroplanes even in bad smashes costs comparatively little to repair. It is very uncommon for a smash to exceed £20. Most mishaps involve the flyer in no greater expense than a sovereign or two, the reason being that the motor, which is the most expensive part of the machine, is rarely injured even when the aeroplane is reduced to matchwood. It would be easy to instance scores of accidents in which the planes and the body have been broken and the motor has escaped without a scratch. The bill for tyres is negligible.

"To sum up. A liberal allowance for running an aeroplane, including an adequate margin for repairs and occasional transport by road, may be represented in the following table of approximate costs:—

Shed, per annum	£100
Wages	£160
Running cost	£70
Repairs	£50
Miscellaneous, tips, &c.	£70"

About this time the Royal Aero Club drew attention to the embarrassment of pupils making their certificate flights, (which necessitated taking many right-hand turns) when other aviators were flying round at the same time, and they required that two pupils flying for their brevets over the same course should fly at different times. The number of flyers was increasing, and every week one saw more and more practice, five or six machines being frequently aloft together. Some of the new machines were high-speed aeroplanes and, just as the chief danger in road traffic is the fact that it is made up of fast and slow vehicles, so also one of the dangers in an aerodrome was due to the flying together of machines of different speeds.

The committee of the Royal Aero Club acquitted Graham Gilmour of having flown to the public danger in his Thames flight of July 5, but it suspended his certificate for a month for having endangered the public at Henley regatta two days later.

The aerial Navigation Bill, brought in in 1911, aroused much adverse comment and even ridicule. The Bill in its original form, indeed, had all the appearance of having been drawn up in haste without reference to any authority on the subject, and without much regard for the rudimentary principles of law-making. Apparently the Government had for some time been labouring under an increasing sense of annoyance with the conquest of the air. Almost immediately Mr. Winston Churchill quartered the period of imprisonment and halved the maximum fine.

"Some day," I wrote, "we shall recall this item of panic legislation and laugh at it. Even as a temporary measure designed, it is claimed, only for the period of the Coronation, it is ridiculous. No new activity of man since the Middle Ages has been so sternly repressed. Two or three years ago an engine-driver who, while intoxicated, wrecked a train with fatal results was given three months' imprisonment. An aviator who flies over a prohibited area is liable to a term of six months!"

The Act was, however, administered with rigour. True, certain exemptions were granted, but one well-known aviator applied for permission to fly an aeroplane from Paris by way of river and sea, finishing with a trip up the Thames, which would have been a notable exhibition of the capabilities of the flying machine. It would, of course, have involved flying over prohibited areas. But since the pilot was an Englishman, and he promised not to carry a camera, and expressed willingness to abide by any conditions, it was rather tyrannical to prohibit the flight altogether. Nevertheless (and not without good reason) residents in the neighbourhood of Hendon and other aerodromes complained of aviators who needlessly flew close to the houses. I agree that the noise of an aeroplane flying overhead at anything less than 1,000 feet is distracting.

And just to remind us of the old ballooning days: The long-distance balloon contest for the challenge cup presented by Mr. F. Hedges Butler began on Saturday, June 22, 1912, from the Hurlingham Club. The following was the order of start: A. Mortimer Singer's "Planet", 80,000 c.f., pilot, A. Mortimer Singer; Mrs. John Dunville's "Banshee II", 80,000 c.f., pilot C. F. Pollock; A. P. Hohler's "Espérance", 50,000 c.f., pilot, A. P. Hohler; Capt. E. M. Maitland's "Pompadour", 50,000 c.f., pilot, Capt. E. M. Maitland. After a trip over the Yorkshire moors, Mrs. Dunville's "Banshee II" came down at Grosmont, near Whitby, on Sunday. Mr. A. Mortimer Singer, in "Planet", made the next longest distance, alighting at Scarborough; Capt. E. M. Maitland's "Pompadour" arrived at Hull; and Mr. A. P. Hohler's "Dunlop I" came down at Alford, in Lincolnshire.

In January, 1912, Mr. S. F. Cody fulfilled his long-standing intention of carrying four passengers in addition to himself in his rebuilt biplane fitted with a 100 h.p. motor, seven miles being covered in the Farnborough district. On the 30th he almost capsized in a race with the army "silent" aeroplane, which he overtook and got into its backwash.

J. Védrines sustained grave injuries in a flying accident in April, 1912, and as he was very well known in British aviation circles (he was Mr. Loraine's mechanic at the Bournemouth meeting), a brief reference to him cannot fail to be interesting. Born at Saint Denis, where revolutionary anti-patriotic doctrines were preached, it is not astonishing that, while practising his calling of mechanic, he imbibed what the French Socialists call "humanitarian" principles. Before becoming an aviator Védrines was not patriotic, and he favoured anti-militarism. Yet his name in a few months became the symbol of love of country and national defence. In an electoral campaign Védrines explained how he had been led to repudiate his former "humanitarian" principles. Addressing a great meeting of electors at Limoux he said: "When I began to fly I was not very patriotic, but travelling at a great altitude and contemplating from aloft the plains, mountains, rivers, and cities of France, I reflected. I also crossed many frontiers into foreign lands, but I was always glad to get back to my country. Well, my friends, I can tell you I was truly happy to be a Frenchman, and I swear I shall be found ready if ever one day I am wanted to defend our dear country."

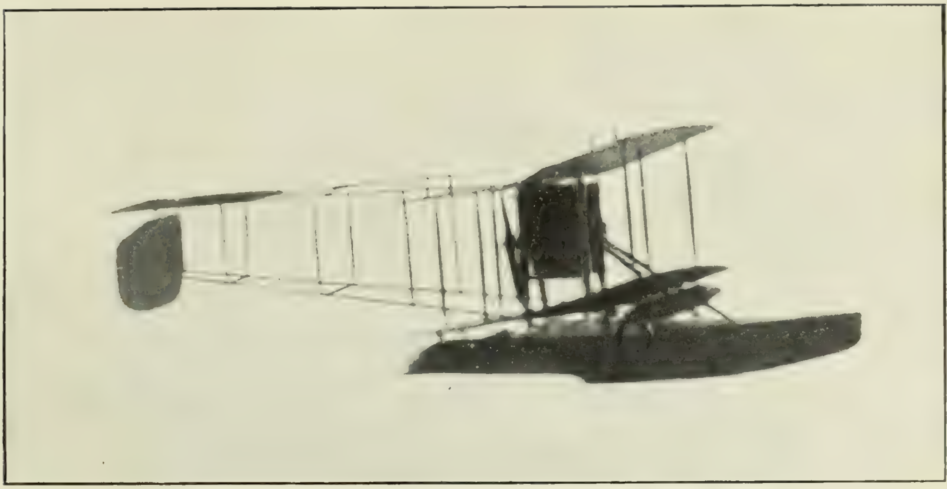
Mr. D. Corbett Wilson, an Irishman who took a French ticket on the Blériot in January, 1912, did a lot of flying in public, including exhibitions in Ireland. He flew from Paris to Fishguard and Ireland, with a halt at Amesbury, and he made a flight from Pau to Loudres. In May, 1913, he flew from Versailles to Dijon and Lausanne over the Jura Alps.

In October, 1911, Captain Livingstone, Mr. C. Paterson and Mr. E. F. Driver went to South Africa to start a school of aviation. They took Blériot monoplanes with them and proposed to start a mail service between Cape Town and Johannesburg.

The late Harry Hawker now shared with B. C. Hucks and Gustav Hamel the chief popular honours. He was an Australian, and from the first was marked out as a test pilot, but he lacked the qualifications required for great endurance feats, which nevertheless he essayed. Unfortunately, he did not possess a robust constitution, and time and again was robbed of success by physical weakness. He made a British endurance record in October, 1912, with a flight on a Sopwith-40 h.p. A.B.C. of 8 hours 23 minutes, winning the Michelin Duration Prize. In May, 1913, he won the altitude contest at Hendon (7,400 feet) on a Sopwith-80 h.p., but eclipsed this by flying with a passenger to 12,900 feet, and with two passengers to 10,600 feet, in the following month at Brooklands. He won the Mortimer Singer prize of £500 for a series of flights on a Sopwith seaplane, alighting, in accordance with the terms of the prize, both on Southampton Water and on land. His machine was fitted with the 100 h.p. Green engine.

On July 27 he made a world altitude record on the Sopwith-80 h.p., carrying three passengers up to 8,400 feet. His flight in the Round Britain seaplane race is recorded elsewhere. In September he flew third in the Aerial Derby. In the attempt to win the Michelin No. 2 prize he flew 270 miles non-stop in five hours. At this time he was in charge of the fitters in the Sopwith works.

He went to Australia in December, 1913, taking a Sopwith biplane, and was received with enthusiasm. There he took



H. G. Hawker on Sopwith "Bat Boat"

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up many distinguished passengers, including the Governor-General and his daughter. He returned to England in June.

Hawker was certainly one of the greatest of aviators. He had many narrow escapes, but after a really astonishing career, and when he had been warned not to fly, he was killed (after the War). For years he had a charmed life, and this was never more strikingly manifested than when he was rescued in the Atlantic, which he attempted to fly with Commander K. Mackenzie Grieve in 1919. They were given up as lost for many days, but they had alighted close to a ship and had been picked up.

Nothing shows the progress of flying in four years more impressively than the following list of "records":—

HEIGHT

1908. Wilbur Wright (Wright biplane) 328 feet
1909. Paulhan (H. Farman biplane) 1,558 feet.
1910. Hoxsey (Wright biplane) 11,474 feet.
1911. Garros (Blériot monoplane) 13,947 feet.

SPEED

1908. Wilbur Wright (Wright biplane) 39 miles an hour.
1909. Delagrange (Blériot monoplane) 50 miles an hour.
1910. Leblanc (Blériot monoplane) 67.5 miles an hour.
1911. Nieuport (Nieuport monoplane) 82.5 miles an hour.

DISTANCE IN A SINGLE FLIGHT

1908. Wilbur Wright (Wright biplane) 77.6 miles.
1909. Farman (H. Farman biplane) 144.5 miles.
1910. Tabuteau (H. Farman biplane) 365 miles.
1911. Gobé (Nieuport monoplane) 462 miles.

DURATION OF A SINGLE FLIGHT

1908. Wilbur Wright (Wright biplane) 2hr. 20min. 23sec.
1909. Farman (H. Farman biplane) 4hr. 17min. 53sec.
1910. Farman (H Farman biplane) 8hr. 12min.
1911. Fourny (M. Farman biplane) 11hr. 1min. 29sec.

DURATION OF A SINGLE FLIGHT WITH ONE PASSENGER

1909. Wilbur Wright (Wrights biplane) 1hr. 35min. 47½sec.
1910. Cammerman (Farman biplane) 4hr. 5min.
1911. Suvelack (Etrich monoplane) 4hr. 33min.

NOTES.—M. Bréguet had carried with him 11 persons a distance of three miles; Mlle. Dutrieu flew 160 miles in 2hr. 58min. The English Channel was crossed 28 times in 1911, as compared with seven times to the end of 1910.

From articles in the *Observer* at the end of 1912, I quote the following remarks:—

"If there are few startling developments or radical improvements to be recorded as having taken place in aeroplane design and construction, there is no doubt that a remarkable uniformity of excellence has been obtained. In principle, neither the aeroplane nor its engine differs from those of twelve months ago; save in some particulars, design remains essentially the same. The progress that has been made has been achieved largely by improvement in detail, by standardisation on a scale previously unattempted, and by the greater skill of the average pilot, owing to greatly increased experience.

"The enormous advance of aviation in general may be gauged from the fact that in 1910 France possessed 272 pilots; in 1911, 561; at the end of 1912 these figures had increased by 100 per cent., and at the present time France alone has a greater number of pilots than the whole world could show at the end of the previous year. In Great Britain there were 55 pilots in 1910, 169 in 1911, and just on 400 at the present time; while German pilots increased from 49 in 1910 to 144 in 1911, and to 380 at the close of the year.

"On December 11, at Tunis, Roland Garros made a world's altitude record by ascending to 19,000 feet; scarcely less notable was the performance of the Russian lady pilot who, on November 22, at Johannisthal, in Germany, rose with a lady passenger to a height of 7,200 feet. The record for the longest continuous flight was established on September 11 by G. Fourny, who, on a Farman biplane, remained in the air for 13 hours 17 minutes, covering a distance of 627 miles. The speed record for the first time has exceeded the 100-miles-an-hour limit, the famous French pilot, Jules Védrines, winning the Gordon-Bennett Aviation Cup in the United States on a monoplane at an average speed of 105½ miles an hour.

"The longest flight across country on a single day was made by P. Daucourt, who on October 27, flew the 529 miles from Valenciennes to Biarritz in 11 hours 39 minutes, including stoppages. The British duration and height records have been materially raised; the former stands to the credit of H. G. Hawker, who piloted a Sopwith biplane fitted with a British A.B.C. engine at Brooklands for 8 hours 23 minutes; while Mr. de Havilland, on a military biplane, with a passenger, eclipsed all previous records by reaching on Salisbury Plain last August an altitude of 10,500 feet."

The reader will have no difficulty in comparing these records with the ever-increasing performances of the present time.

The Schneider Maritime Trophy competition held at Monaco in April, 1912, resulted in a triumph for Great Britain. Mr. C. H. Pixton on his Sopwith machine carried everything before him. The race consisted of an oversea flight of 280 kilomètres

(172½ miles). The 10-kilomètre (six and a quarter miles) course had consequently to be covered twenty-eight times. Espanet and Levasseur, each piloting a Nieuport seaplane, started one after the other almost immediately after the opening of the competition at 8 a.m. But at 8 hours 16 minutes Mr. Pixton took off the water, and in covering the first round of the 10-kilomètre circuit in 4 minutes 27.3-5 seconds, including the two compulsory descents on the sea, at once demonstrated that, barring a breakdown of his 100 h.p. Gnome motor, he held victory in his hand. Indeed, Espanet and Levasseur had occupied respectively 8 minutes 55.3-5 seconds and 9 minutes 17 seconds to make the same round; and Burri, who followed on his Franco-British Aviation seaplane (a French machine), and which took second place in the contest, occupied 6 minutes 17.4-5 seconds. Garros, the French champion, had given his place in the race to Prévost, who won the Schneider Cup in 1911. Unfortunately, he broke the propeller of his Deperdussin in rising off the rather rough sea at Fontvieille. Neither Hirth nor Stoeffler put in an appearance to pilot the German seaplanes, and the two American champions, Weymann and Thaw, when they saw the British champion had covered the 280 kilomètres in 2 hours 0 minutes 13.2-5 seconds recognised the impossibility of winning, and refrained from starting. The second British champion, Lord Carbery, who flew Janoir's machine without being familiar with it, started, but soon abandoned the race.

CHAPTER XI

MY NOTEBOOK—III

An experiment in parachute dropping from an aeroplane in flight was made at Hendon in May, 1914. Of course this was but a crude beginning, and much research and many experiments were required to develop the close-packed Service parachute as used to-day. At Hendon the parachutist, W. Newell, was taken up on a Grahame-White biplane piloted by Mr. Reginald Carr, who also carried two other well-known airmen, Messrs. F. W. Goodden and L. Lillywhite. Mr. Newell took his seat on one of the landing skids in front of the machine. When the biplane reached an altitude of 2,000 feet, he jumped clear. The parachute quickly opened, and Mr. Newell made a most successful descent, the time occupied from the moment when he left the aeroplane until he alighted on the ground being 2 minutes 22 seconds. His parachute was 30 feet long, weighed 40 lbs., and when opened out was 26 feet in diameter.

The Navy League founded a National Aerial Defence Association, of whose Executive Committee I was a member; but I fear the association did very little effective work. No one can say what would have been the trend of events if there had been no Great War. There was an Aerial League which was no more effective than the Navy League's aerial sympathisers. Perhaps the time was not ripe. But just as I am convinced that as an appanage of the Fleet the Air Arm would be neglected, circumscribed, and hampered, so I am sure air propaganda should be free from Naval influence.

I wrote the following note about the Aerial League's activities: " Aviation is suffering from well-meaning but futile and embarrassing friends. Also, it is becoming manifest that the British public and the British Government are prejudiced against aviation by the ill-informed and misdirected efforts of these well-meaning people. Heaven knows what an amount of stone-wall cynicism has been created in the City and, indeed, throughout the land by the meeting held by the Aerial League at the Mansion House!

" The attendance was scanty, and but for the presence of a battalion of boy scouts at the back, the appearance of the hall would have been almost desolate. Perhaps it was fortunate that the audience was made up of a few aeronautical people, a large number of journalists and boy scouts, and that the City man was conspicuous by his absence. The City man, indeed, is not to be recruited in this particular way. The public, of course, could read the report of the meeting; and most of these reports, I am glad to say, conveyed a sufficiently accurate impression of the futility of the proceedings. For Empire Day and a patriotic appeal by speakers of eminence, the result was eloquent of the small esteem in which the appeal was regarded.

"Doubtless those responsible are now complaining of the lack of support they received; but the reason is perfectly clear. Business men are the last people to be moved by a cause which is not presented to them in a fair and accurate way. There were several features about the Coronation Appeal for £250,000 for the work of the Aerial League which were quite certain to keep the average business man at a distance. Much could be said about the unbusinesslike character of the proposals and the apparently hurried manner in which they were framed. The bad impression given in this way was completed by the presentment of the case at the meeting.

"The introductory speakers said that they would give way in order that men of authority might speak. It then became painfully evident that the committee had omitted to supply these speakers with facts upon which they could base their eloquence. For instance, one speaker declared that the French Government have 160 aeroplanes and a call upon 500 more, and that 'Germany possesses the same number.' Not many 'facts' were put forward, but this will serve for an example! Then that very old tag to the effect that for the price of one super-Dreadnought we could possess 2,500 aeroplanes or 250 dirigible balloons!

"There is abundant work for such an organisation as the Aerial League, but is it not time that the Committee of the League realised that the man in the street, even if he be not an expert in aeronautics, can read his newspaper, and that the business man is apt to be exigent in his demand for accuracy in evidence brought forward in support of any appeal to his pocket? There is quite a lot of reliable information obtainable about the progress of mechanical flight, and I am quite certain that the people of Great Britain will not be wanting in their duty when the case is presented to them in a proper way. But such a meeting as that at the Mansion House really does an infinite amount of harm."

Much the same might have been said of some post-War propaganda.

But there was better propaganda, that of practical demonstration. Henri Salmet, who started as a mechanic to the Blériot firm at Hendon, and took his " ticket ", No. 99, on a Blériot on July 27, 1911, was flying all over the country giving demonstrations. One of his flights was from London to Paris, via Eastbourne and Dieppe, and back, in 3 hours 16 minutes. He went through an operation for appendicitis in June, 1912, and fourteen days after he flew 50 miles.

About this time the London Aero Club, an educational organisation, was founded in connection with the Northampton Institute, where aeronautical courses were given by Mr. Handley Page and other practical men. The London Aero Club was a happy band of young men who had already undergone pretty severe training in the excellent workshop of the Northampton Institute, and had reached an advanced stage of instruction in aeronautics generally. They had begun the building of a biplane of the Caudron type. They shared the work, and were severe in their demand for good and accurate craftsmanship. If I remember aright the machine was completed; and it may have been flown.

One of the great controversies of 1914 related to automatic and inherent stability. The designs of the Royal Aircraft Factory possessed inherent stability in some degree, the B.E. 2c in an almost complete sense. But critics said that too much was sacrificed for this quality, and were righteously wrathful when statesmen began to talk about "fool proof" machines.

There had been many experimenters in stability, among others José Weiss, Etrich and Major Dunne. The Royal Aircraft Factory designers, possibly inspired by Mr. Lanchester's work, went to work in a different way. One of their types was the R. E. (Reconnaissance Experimental) which, although in appearance of normal design, was almost as stable as the Dunne and the Handley Page. It was, perhaps, superior to the Dunne in that its stability depended less upon delicate curves and angles in the shape of the wings. But a point in favour of the Dunne was the rearward position of the propeller and the superior field of fire in front and at the sides. The R.E., as Dr. Glazebrook pointed out, was a very valuable design because it verified laboratory experiments and promised greater precision and economy in future designing than had been possible in the past.

No amount of natural stability would, however, enable a machine to land safely through troubled air near the ground, without skilful piloting and knowledge of the air.

As to the B.E., it was rightly contended that stability was secured at a sacrifice of controllability and performance, and therefore was sometimes responsible for a pilot's failure to get out of trouble just before landing. As a fighter against fast, manœuvrable, but not inherently stable machines, it was hopelessly outclassed.

The Wright "fool proof" aeroplane was stable by means of an elaborate mechanism. Very good results were said to have been obtained.

The Handley Page biplane was, like the Dunne, a naturally stable machine, having wings of varied curve and angle, but was quite different from the Dunne. It was flown with, as well as without, a tail. It did good work in the hands of Mr. Rowland Ding. Lieutenant Wilfred Parke flew it, and wrote a detailed description of its behaviour. On one occasion, caught in an eddy, it fell 200 feet vertically on level keel. Here are a few sentences from Lieutenant Parke's long report, which can easily be referred to by those in search of information:

> " Her lateral stability is as near perfect as I can imagine; she just simply floats about quietly, quite regardless of remous, propeller draughts, etc.; you can feel them hit her, and her consequent automaticing, but it does not worry her at all. . . . As regards banking, she takes up her own angle quite naturally.
>
> "Longitudinal stability—I have so far been unable to determine accurately whether there is any serious improvement here over other recently designed machines on standard lines: Longitudinal control is usually so easy that one would not notice this much. . . . I think she must have something subtle, as, in spite of the passenger's seat being right back in rear, the difference between 16-stone and 6-stone makes no appreciable difference in balance or control.
>
> "For pure pleasure of flying it is miles ahead of anything I have ever been in."

Lieutenant Parke's death on a similar machine was, as is well known, due to causes in which neither automatic stability nor its lack played any part.

There was at Brooklands an excellent example of another kind of stability machine. This was the D.F.W. biplane, a German type, that was to be made under license by an English firm. The D.F.W. had sloped back wings, the bottom one having a dihedral angle. Apart from the fabric over the wings, the structure was of steel, and was immensely strong, the undercarriage seeming capable of standing anything in the way of rough landings.

A feature of this craft was the position of pilot and passenger, the latter well back of the engine, and the pilot three or four feet behind him. The D.F.W., on which I had two or three flights, seemed to be easily manœuvrable, but it took a long time to take off. Herr Roempler was the pilot. The war, of course, put an end to his projects. He returned to Germany, and was said to be the enemy airman who flew over Dover just after the outbreak of War.

Many air line and other projects were discussed in the few weeks before the War. There was to be a regular seaplane service between Southampton and the Isle of Wight. Mr. Pemberton Billing had established the works and the name "Supermarine" at Southampton, and he built a so-called "aerial charabanc." The seaplanes were to leave either the works' slipways or the Town Quay every morning and evening, and their base in the Isle of Wight was to be Cowes.

A great flight was made by the Norwegian Naval pilot, Lieut. Gran (who accompained Capt. Scott to the Antarctic). On July 30th, he flew from Cruden Bay, Aberdeenshire, to Kleppe, near Stavanger, Norway—320 miles in 4 hours 10 minutes, one of the most daring oversea flights so far accomplished, almost equalling Garros's flight of nearly 500 miles across the Mediterranean.

Lord Carbery, an Irish peer, was doing a lot of flying in 1914, and undoubtedly had the gift of it. From the pupil stage he advanced with uncommon rapidity to the making of big flights, showing mastery of the air in high winds, and, if anything, presuming too much on his own powers and on the virtues of his aeroplane. Actually he was among the first batch of "loopers," a remarkable thing in view of the fact that, like Gustav Hamel, he flew a high-powered machine of quite a different type from the specially made "looping" Blériot monoplane on which Pégoud showed the way. His looping was very daring, and caused experienced critics to look anxious. After bringing the machine up and over to the inverted position, Lord Carbery sometimes caused it to turn with a jerk sideways, whence it sideslipped a long way before resuming the normal flying attitude.

Although there were over 800 holders of the Royal Aero Club certificate for aviation, flying was still an unusual accomplishment. The late Sir David Henderson, the Director of Military Aeronautics, was indeed led to utter a rebuke when called upon to speak at an Aeronautical Society dinner. He said:

"Flying has not yet become popular among the gilded youth of this country. For some strange reason well-to-do people seem to think it is their duty to society to die in their beds. There is a proverb that those whom the gods love die young, which possibly accounts for the prolongation of some lives, for certainly one cannot see in many of the aforementioned gilded youth any attraction for gods, still less for goddesses."

General Henderson's rebuke was merited in innumerable cases; and in this, as in every age, it is to be deplored that so many people of leisure and means value ease and safety and luxury above all else. There were, however, many exceptions. Lord Edward Grosvenor was a pilot. Lord Carbery was another. Then we had among British pilots, some of them in the Royal Flying Corps:

Sir Archibald Sinclair, Bart., the Hon M. Egerton, the Hon. F. W. L. Vernon, Sir Bryan Leighton, Bart., the Hon. Rupert Lyttelton-Pelham, the Hon. J. Crawford-Kehrmann, the Hon. Claud Brabazon, Sir Alex. Bannerman, Bart., and many others. Among the people who had been up as passengers were Princess Louise of Battenburg, and Princes George and Albert of Battenberg; Prince Leopold of Battenberg looped-the-loop with Hamel. Abroad, the King of Italy and the Queen of Sweden had been up in airships, as had a dozen German princes and princesses.

Princess Ludwig of Lowenstein-Wertheim (formerly Lady Anne Saville) was at this period learning to fly at Hendon on the Wright and Handley Page aeroplanes.

A personality which much interested the public was that of the late Miss Trehawke Davies, a lady of delicate constitution and somewhat nervous disposition, who loved flying as a passenger. Throughout 1911, 1912, 1913, and part of 1914 she was making innumerable flights, some of them across the Channel. Her pilots included Mr. H. Barber, Gustav Hamel, H. J. D. Astley, Brindejonc des Moulinais, G. Legagneaux, R. O. Crawshay, and many others. She was the first lady to "loop-the-loop", her pilot being Gustav Hamel. Miss Trehawke Davies declared flying was beneficial to her health.

One is struck by the number of famous aviators who have died from the common ills of mankind, and not from accident. One of these was Major H. F. Wood, who was for many years with Vickers, Ltd. He was formerly an officer in the Lancers, with whom he served in South Africa, but he was attracted to flying in the early days, and threw himself into it with great enthusiasm, obtaining certificate No. 37 on a Bristol biplane at Brooklands in November, 1910. For a time he worked for the Bristol Aeroplane Co., but transferred to Vickers, managing their aviation department until the time of his death. He had a brief interlude from aviation, and was in the great retreat to the Marne. He died from meningitis following influenza.

In the *Field* of August 1, 1914, I wrote:

"Flying in England is becoming decentralised. For a time the interest was far too much centred in Hendon. Brooklands seemed to decline; and although naval and military aviation expanded apace, there was not much in it for the public. Now without any detraction from Hendon, which must for many reasons remain the most popular aerodrome, other sporting centres are coming into robust being. Brooklands is of rapidly increasing interest for school and experimental work. It is now the Bristol head-quarters, the Blériot centre, and the D.F.W. abode. At all these places one misses the small experimenter who naturally, in the early days, figured so importantly in flying. Aviation is more and more a matter for firms, and there is less room for the inventor-constructor. But it is farther afield from London that one finds the most striking examples of the increase of the sporting side of flying. At Shoreham aerodrome, for example, any week-end one may now see plenty of good flying, often including clever trick-flying and aeroplane races. Also on the south coast there is Eastbourne aerodrome which, like Shoreham, has its manufacturing side; and to the west, in the neighbourhood of the Isle of Wight and Southampton is a home of British seaplane manufacture, a title that might reasonably be disputed on behalf of Eastchurch, where the Short machines are made. Meanwhile, all over the country great interest is shown by the public in exhibition flying, and Mr. Hucks, the chief exponent, is having a most strenuous year, he and Mr. Manton together giving every week remarkable and well-attended shows. Lord Carbery last week demonstrated before his fellow-countrymen in Ireland, where he looped the loop, taking his wife with him on one looping display, and thereby creating a record, for surely he is the first looper to be accompanied by his wife. Messrs. C. L. and E. C. Pashley at Shoreham are busy with pupils and experiments."

The crossing of the Atlantic by aeroplane was now seriously contemplated, and Lieut. J. C. Porte was one of the British aspirants to the honour of being first across. Lieut. Porte had a fairly seaworthy air-boat, and, except in rough water, could alight and make a fresh ascent. This, coupled with his decision to take an indirect route, calling at the Azores, put the matter on a reasonable basis. The machine did not do much more than sixty miles per hour. Starting on a north-westerly wind, which at 3,000 feet or so would put thirty-five or forty miles per hour on to his speed, he would have required about fourteen hours to make the Azores.

I wrote in the *Field*:—

"So much nonsense is being talked about the proposed trans-Atlantic aeroplane trip that there is some little danger of under-estimating the seriousness of one or two of the projects. For example, it is certain that Lieut. J. C. Porte is to be engaged in an attempt very soon, and anyone who knows Lieut. Porte must recognise he is the last man to concern himself with a wild goose chase. Most of the details published about his enterprise are inaccurate. Lieut. Porte is going to depend upon a single 200 h.p. engine for making a non-stop run of considerably more than twenty hours. One would not say it is impossible, although it is difficult to see how the machine could carry fuel and oil for more than twenty-one hours; but it is well to remember that the longest flight of an aeroplane hitherto has been one of sixteen and a quarter hours. So that for a journey bristling with difficulties of other kinds, dependence is to be placed upon beating the present record by an enormous margin."

Mr. Gustav Hamel had a most interesting scheme. He was to use a Martin-Handasyde aeroplane without floats, but so designed that when once over the sea and started on its journey the chassis could be dropped off entirely, thus greatly lightening the load and reducing head-resistance. The craft, if it had been compelled to descend to the sea, would have been a raft, capable of floating for an indefinite time, except in very rough weather.

Alas, Hamel's death put an end to his trans-Atlantic and other projects. He would have gone on to great things, for the King had recognised his qualities and had discussed with him the question of offering a prize for an aerial contest. This was not to be realised until after the War.

Hamel gave a brilliant demonstration of trick flying before the King and Queen at Windsor. He looped the loop repeatedly, and accomplished other evolutions on his Morane-Saulnier monoplane.

On April 17, 1913, Hamel flew with a passenger from Dover to Cologne, 320 miles, without a stop. The journey, apart from the distance covered, the time which it occupied, and the weather conditions (which were highly unfavourable), was remarkable. For the first time, without previous arrangement, an aeroplane, carrying a passenger, and representing a total weight of nearly one ton, travelled unchecked by any difficulties over five frontiers and the soil of four foreign nations—in a single flight. In addition to the obvious difficulty of the journey, the pilot had to outfly a storm which he overtook before reaching Holland, during which hailstones drew blood where they hit the aviator's face, and only his consummate skill prevented disaster.

By June, 1913, Hamel had crossed the Channel seven times, and had made extensive voyages over France and Belgium. He landed in all sorts of places, far from towns and at great distances from aeroplane depôts. He had innumerable adventures. All that he took with him was a small tool case and repair outfit, a suit case, and his passenger's luggage. The worst difficulty he had to contend with was that of obtaining oil. Petrol could be obtained in the smallest villages, especially in France; but oil suitable for the Gnome motor could only be obtained in large towns, and not always then. Hamel's aerial exploits often caused the wiseacre's to shake their heads, and certainly he sometimes flew in a style that appeared to be sporting with death. Yet, as a matter of fact, he took far fewer risks than many flyers. He knew the air as few knew it. With reference to these criticisms, he said to me: "You must remember, I have been flying almost every day for three years, and have gained experience and confidence that can only be gained in that way." His very immunity from accident was proof of his contention. This, indeed, was remarkable in view of the fact that he usually flew fast monoplanes—often racers—and that he was ever in the forefront in trick-flying of all kinds. There was no one like him for giving confidence to his passenger. And there was never anything so exhilarating as a flight with him when he was "out for fun" in the way of spirals or loops.

Hamel learned to fly in 1910, when he was twenty-one years of age, and had not long left Cambridge, where he was an undergraduate after leaving Westminster School. Within a month of getting his certificate he won a cross-country race between Hendon and Brooklands. He flew in the Budapesth Meeting in 1910. He won the Brooklands-Brighton race on May 6, 1911, and, as already related, took part in the aerial post between Hendon and Windsor. He was second in the Aerial Derby in 1912, and first in the same race in 1913. He flew in the circuit of Anjou in June, 1912, in terrible weather. Across country, he must have flown tens of thousands of miles. There are on record no fewer than fourteen cross-Channel flights by him, many of them with passengers.

So often was his name coupled with social leaders in the respective capacities of pilot and passenger that he was called the "Society flyer." One of his passengers was Prince Leopold of Battenberg, with whom he looped the loop. Hamel was extremely popular in all circles, and on the occasion of his two "command" exhibitions at Windsor, the King took the kindliest interest in him. His Majesty accepted a copy of our book, and sent a letter expressing his great interest in it; and but for his untimely death, Hamel was to have had the honour of having luncheon with their Majesties at Buckingham Palace. All this shows how far real merit, combined with modesty and attractive personal qualities generally, will carry a man

And, by contrast, is not the story of aviation marked by examples of the opposite, of men who achieved a certain measure of success, and might have gone on to great things but that they were not quite free from the imputation of "bounding"?

On Saturday, May 23, 1914, while flying from Villacoublay with the intention of arriving at Hendon in time to take part in the Aerial Derby, Hamel was lost at sea, in circumstances that left no hope. He was flying a new Morane-Saulnier monoplane, 160 h.p. Gnome motor, and in the early morning had accomplished the Villacoublay-Le Crotoy stage—a distance of 108 miles—in fifty minutes, what wind there was being abeam. The speed of his machine, therefore, was something like 130 miles per hour. At Le Crotoy he landed on the smooth sand of the estuary of the Somme, at the Caudron aeroplane works. He flew another short stage to Hardelot, near Boulogne, and he resumed his journey at 12.15. He was seen at Boulogne flying high, and there were vague reports that he was seen over Calais, and, by a steamer, over mid-Channel. In any case, there is no doubt that he attempted the crossing, because he sent a telegram to Hendon saying he would arrive by air; and when he left Hardelot that was his intention. His machine was capable of carrying only enough fuel and oil for two hours' flying, but this would have been enough to take him to Hendon. The actual sea passage should have taken no more than fifteen minutes. There was a good deal of mist, which made it possible to get off the proper course owing to an unknown amount of drift. Hamel was, however, an old hand at crossing the Channel, and the fact that he decided to go on is sufficient proof that the risk was not in his opinion excessive; none knew better than he what to do in the circumstances.

The danger lay more in attempting the Channel crossing, or, for that matter, cross-country flying at all on a racing high-speed monoplane that required a large space of smooth land safely to descend upon, and was decidedly unsuited for alighting upon the water. It was a machine, moreover, that would not float for long even if it did not capsize in alighting. Hamel may have gone out of his course and exhausted his fuel out of sight of land; or failure of the engine may have compelled him to come down between Calais and Dover. In any case, he was not seen again. Inquiries were made along the coast on Saturday and Sunday; but it was not until Sunday that it was definitely determined that he had actually left the French coast. Many warships patrolled the Channel, and on Sunday seaplanes of the Naval Air Service joined in the search in very adverse conditions. So rough was the sea that two of them, piloted by Commander Samson and Lieut. Brodribb, were wrecked in alighting, the last-named officer having a narrow escape from drowning. Shortly after, evidence was brought forward in court by fishermen proving that the aviator's dead body had been seen in the water.

About the middle of 1914 the following were the flight records:

AEROPLANES

Absolute speed in closed circuit, 126.67 miles per hour, Prévost (France).
Distance, 1,200 miles, Landemann (Germany).
Duration, 21 hours 49 minutes, Landemann (Germany). (A number of flights over 16 hours had been made).
Duration with eight passengers, 2 hours 6 minutes, Sikorsky (Russia).
Altitude, 20,670 feet, Linnekogel (Germany). (The French papers still gave Legagneux's 20,078 feet).
Altitude with one passenger, 20,242 feet, Bier (Austria).
Altitude with two passengers, 17,847 feet, Bier (Austria).
Altitude with three passengers, 15,649 feet, Loessel (Germany).
Altitude with four passengers, 10,335 feet, Garaix (France).
Altitude with five passengers, 7,318 feet, Garaix (France).
Altitude with ten passengers, 6,561 feet, Sikorsky (Russia).

AIRSHIPS

Duration, "Adjudant Vincenot," 35 hours 20 minutes (France)
Altitude "L3", 10,256 (Germany).

BALLOONS

Duration, Kaulen and Schmitz, 87 hours (Germany).
Distance, Berliner and another, 1,815 miles (Germany).

The reason the airship duration was so short was simply because no attempt was made to beat it. Many airships had a greater capacity than thirty-six hours, but ascents were made for more important purposes than the beating of records.

CHAPTER XII

CROSSING THE CHANNEL

I WAS in Frankfort when M. Louis Blériot crossed the Channel. He and Hubert Latham had been waiting a fortnight for a favourable opportunity, each hoping to be the first across, and three days before M. Blériot's successful crossing Latham made an attempt. But his engine failed when he was about seven miles out to sea, and he came down and was picked up by the destroyer that was accompanying him, and taken back to Calais. The destroyer was a little ahead, and took five minutes in turning back and reaching him, but his Antoinette monoplane floated, and he was found sitting with his feet up to keep them from getting wet; he had just lighted a cigarette! As it might have easily been another fortnight before a successful flight was made, and the Frankfort exhibition was going to be very important, I went there, hoping to be back in time to see the Channel flown, but I was still at Frankfort when the news came that M. Blériot had got across, flying his "No. XI" fitted with a 25 h.p. Anzani engine.

M. Blériot, who crossed in the early hours of Sunday morning, July 25, 1909, thus won the prize of £1,000 offered by the *Daily Mail* eight months previously to the aviator who should be the first to fly across the Channel. On Saturday evening there had been a conference between him and Latham and the Port Commander, and it had been decided that the two available torpedo-boats should be placed at the disposal of Latham, while a destroyer was told off to accompany M. Blériot. When Latham left his rival at midnight for Sangatte, the wind was gradually falling.

M. Blériot determined to start at dawn and steal a march on Latham. He was suffering from a very painful foot which had been burned in an aeroplane accident just before this time and, under insufficient care, had developed an abscess. He had to use this foot for the rudder control of his machine. He got up at 3.30 a.m. and went to Les Baraques and examined his aeroplane. The engine worked well, and at four o'clock he made a trial flight for a quarter of an hour around Calais and its environs, a circuit of about nine and a half miles, and descended on the spot on the cliff from which he intended to start. He waited for the sun to rise, the conditions of the prize requiring that the flight should be made between sunrise and sunset. At 4.40 the sun was up, a light breeze was blowing from the south-west, the air was clear. M. Blériot started, and the two thousand spectators who had assembled on the quays saw his machine rise quickly, pass over the telegraph wires along the edge of the cliff, and go out to sea. In ten minutes he had passed the destroyer *Escopette*, which was heading for Dover at full speed, with Madame Blériot on board.

In the meantime Latham was sleeping at the Hotel de la Plage at Sangatte. M. Levavasseur, the Antoinette designer, got up at 2 a.m. and 3 a.m. Each time he looked out at the weather, shook his head, and returned to bed. About half-past four he got up again and, partially dressed, went out on to the verandah. At this moment he heard a remark about M. Blériot having started, and simultaneously he saw the monoplane travelling rapidly over the sea several miles away. The scene when Latham awoke and learnt what had happened may be imagined. But he was a good sportsman, and when the news came of M. Blériot's success he joined in the cheering heartily, and sent him a wireless message, "*Cordiales félicitations. Espère vous suivre bientôt.*" M. Blériot was equally sporting, and as soon as he realised he had gained the prize he said that if Latham got across that same day he would share the £1,000 with him. But the wind was freshening every minute and M. Levavasseur forbade Latham to start. The tension of the last fortnight had told upon Latham severely, and this disappointment coming at the end of it had its effect, and those who saw him said he appeared to be on the verge of a nervous breakdown. Nevertheless he had taken out his Antoinette and had fully intended to make an attempt.

After M. Blériot had flown ten minutes he lost sight of the destroyer *Escopette*. From his narrative in the *Daily Mail* the following is extracted:

"Ten minutes have gone. I have passed the destroyer, and I turn my head to see whether I am proceeding in the right direction. I am amazed. There is nothing to be seen, neither the torpedo-destroyer, nor France, nor England. I am alone. I can see nothing at all. For ten minutes I am lost. It is a strange position, to be alone, unguided, without compass, in the air over the middle of the Channel. I touch nothing. My hands and feet rest lightly on the levers. I let the aeroplane take its own course. I care not whither it goes. For ten minutes I continue, neither falling, nor rising, nor turning. And then, twenty minutes after I have left the French coast, I see the cliffs of Dover, the castle, and away to the west the spot where I had intended to land. What can I do? It is evident that the wind has taken me out of my course. I am almost at St. Margaret's Bay and going in the direction of the Goodwin sands. Now it is time to attend to the steering. I press the lever with my foot, and turn towards the west. Now, indeed, I am in difficulties for the wind here by the cliffs is much stronger, and my speed is reduced as I fight against it. Still steadily I fly westwards, hoping to cross the Harbour and reach the Shakespeare Cliff. I see an opening in the cliff. Although I am confident that I can continue for an hour and a half, that I might indeed return to Calais, I cannot resist the opportunity of making a landing on this green spot. Once more I turn my aeroplane, and, describing a half-circle, I enter the opening and find myself again over dry land. Avoiding the red buildings on my right, I attempt a landing, but the wind catches me. I stop my motor, and the machine falls."

Evidently he had underestimated the strength of the south-west wind, and had been carried too far to the east. Directly he knew this he turned back along the coast, and apparently could only reach a landing place through a gap in the cliffs. No doubt he found the air over this broken coast difficult to fly in, and, arrived at a possible landing place, he cut off his engine and " pancaked ", breaking the propeller. His machine, as compared with Latham's Antoinette had a very high power-loading, that is to say, its wings in relation to the power of the engine were so small that the machine was a poor climber. The load in relation to wing surface, however, was about the same as that of the Antoinette.

M. Blériot had made ten previous types of machines before the Blériot XI in which he made this flight. He began by designing a flying machine with movable wings which were intended to imitate closely the flight of birds. His first inspiration came to him in 1900 at the Paris Exhibition, when he saw the great bat-like machine constructed years before by Ader, which had an electric motor, with accumulators, that appeared to weigh about a ton. Ader's gigantic bat had fixed wings. M. Blériot thought he could improve on it by making one with movable wings, and, after three years, he produced a machine which moved and flapped its wings to such an extent that it shook itself to pieces. The experiments cost him a lot of money, but happily, in the first three years of motoring, he had invented a lamp which was a great success.

His first machine having destroyed itself, he turned his thoughts to gliders. Reports of the success of the Wright Brothers stimulated him to fresh activity, and he asked M. Surcouf to build a glider for him. When experimenting with this glider he got into touch with the Voisin Brothers, and founded an aeroplane workshop with them. They took up the biplane idea, but constant failure attended their first experiments, and M. Blériot in disgust gave up biplanes in 1906, and left the Voisins. In 1907 his first monoplane came into being. It was his sixth attempt. He took it out for its first trial with intense excitement. Would it leave the ground? At first he taxied it to see what it would do. Then he attempted a flight and, to use his own words, "the machine gave a terrific bound upwards." It darted into the air at such a rate that it frightened him. He thought he would be killed; and then what would happen to his wife, who had implored him not to risk his life, and to his children? He tried to land, but the controls worked too abruptly and he crashed. The motor, which was at the back, had turned completely round, but happily the propeller was between it and him and deadened the shock.

His next machine was a further improvement. It was completed on September 17, 1907, and with this he made his first real flight, which the French Aero Club recognised by awarding him a medal. But No. 7 met its fate, like several subsequent ones, which were smashed one after another.

When he counted up all that his experiments had cost him by that time he was almost in despair. More than £30,000 had been spent, and he was on the verge of ruin. But success came to him with his monoplane No. XI after nine years of perseverence and heavy losses. During the fortnight that he crossed the Channel he won over £4,000 (this sum included the £2,000 Prix Osiris for the encouragement of aviation), and he was made a Chevalier of the Legion of Honour. His aeroplane was exhibited in London, and in seven hours over 25,000 people inspected it. It is now in the Conservatoire des Arts et Métiers, but a blade of its propeller adorns a room at the Royal Aero Club. A memorial, an aeroplane in stone, in the turf, marks the spot where he landed. M. Blériot had promised his wife that he would do no more flying after the Channel flight, but she was so delighted with his success that in an interview after it she said:

" Aviation is his very life, and henceforth I shall certainly not ask him to give it up, and if, when my two boys are grown up they wish to be aviators like their father I shall have no objection. On the contrary, I shall be proud to see them fly."

Immediately M. Blériot had crossed the Channel Baron de Forest, who had offered a prize of £2,000 to the first Englishman to fly the Channel in an English aeroplane, doubled the sum.

Three days after M. Blériot's success Latham made another attempt in a new Antoinette, and got within a couple of miles of Dover, when his engine failed and he came down in the sea in view of the large crowd that had assembled. This time he was less fortunate than before, for the goggles he was wearing were broken, and severely cut his face.

When the monoplane struck the sea it became partially submerged, but after a minute or so Latham could be seen standing up and waving his hand. The French destroyer and a flotilla of four French torpedo boats that had been sent out to follow the flight could be seen tearing across the Channel at full speed and there was a race to the spot of the steam pinnaces and longboats of the Atlantic Fleet battleships in Dover Harbour, of motor craft, and of steam tugs. The British boats reached the spot first, but almost immediately the French destroyer came up and Latham got on her, while the steam pinnaces of the battleships towed the wrecked monoplane into harbour.

The flight was in every way a marvellous one, the monoplane having taken only twenty minutes from the time it was launched on the French cliffs until the mishap that brought it to an end. Latham had then covered about twenty-one miles, so that the speed had been much greater than that of M. Blériot's successful flight (more than half an hour), and had, indeed, been fully a mile a minute. Latham had made an early trial flight in the morning and had slightly damaged his machine, which had a 100 h.p. motor—twice as powerful as that of the machine in which he made his first attempt. It was raining most of the time across, and it was estimated that the greatest height at which he flew was 200 feet above the sea.

Hubert Latham was about twenty-six years of age at this time. He was a Parisian, although his father came from Lancashire, and he had spent fifteen months at Balliol. So like an Englishman was he in many ways that the British newspapers claimed him as one and invariably referred to him as " Mr." Latham. He was keen on all kinds of sport and was a hunter of big game, travelling extensively in Africa and

India. Not long after the Blackpool meeting he was killed by a buffalo in Africa.

The Antoinette monoplane was undoubtedly a better flying machine than the Blériot, and it was only prevented from taking first place by the unreliability of its motor. M. Blériot, on the other hand, soon after the Channel flight, staked all on the Gnome, and for those days this was a remarkably good motor except from the point of view of oil consumption. The Antoinette monoplane was far more stable than the Blériot, its big dihedral and big empennage rendering it almost perfectly self-balancing. Indeed the pilot could take his hands off for considerable periods without the slightest risk. This was well illustrated by an incident at one of the aeroplane meetings in, I think, 1910. Chavez, the hero of a trans-Alpine flight, was up on a biplane at a great height when he saw Latham on his Antoinette far below but mounting towards him. He saw the propellors of the Antoinette suddenly stop, and the pilot throw up both hands as if in despair. Then he saw the monoplane glide gently to earth, the pilot not attempting to touch the controls until the ground was nearly reached. At that time the sudden stoppage of the motor was regarded as a danger only to be met by instant action, for the pilot must at all costs get the head of the machine down and keep it at the right path of descent. The Antoinette in that case, however, could be safely left to take care of itself.

The Channel was not again successfully flown until May 21 of the following year, 1910, when M. Jacques de Lesseps, the youngest son of the engineer of the Suez Canal, crossed in a Blériot monoplane with a 50 h.p. Gnome engine.

His start from Les Baraques was delayed by bad weather, and it was not until twenty minutes to four in the afternoon that De Lesseps started. After a thunderstorm in the early morning the Channel was covered with a mist which was increasing in density, although at the time of the ascent it was possible to see about three miles. De Lesseps was strongly advised not to start, but he insisted upon doing so, saying he would turn back if he found the mist too thick. He did not have to turn back, however, but thirty minutes later made an excellent landing near St. Margaret's Bay, just behind the South Foreland lighthouse, thus just beating M. Blériot's time. Towards the end of his journey the engine was misfiring badly, owing to an obstruction in the petrol pipe. The destroyer *Escopette* had accompanied him, frequently sounding syrens to give him direction, but he only saw her once, when he was ten miles out, although that glimpse gave him the assurance that he was heading in the right direction for Dover. He was obliged to fly above the fog, and was flying most of the time at a height of from 1,000 to 1,200 feet.

By his successful crossing De Lesseps won the prize of £500 offered by the firm of MM. Ruinart et Fils to the first airman who, after giving ten days' notice of his intention, should cross the Channel on a Saturday or Sunday in that year.

We who were waiting at Calais to see the Hon. C. S. Rolls, who was to attempt to fly across from England, had rather welcomed the break in the weather, which threatened to delay De Lesseps' flight, hoping that it might mean that Rolls would make the crossing first. However, it was not until eleven days later that Rolls made his successful double crossing.

Leaving St. Margaret's Bay about 6.30 in the evening of June 1, he made an even course in a sky which was so clear that the spectators were able to see his aeroplane until it was within five miles of the French coast.

For two weeks I had been waiting at Calais to guide Rolls to a landing place, and to check the flight. The aeroplane was first seen by villagers to the west of us, near Sangatte. While I was looking through binoculars at Dover Castle I was startled by shouts and exclamations. The aeroplane was far to the west, about four miles distant, conspicuous against a lovely opalescent sky. This was 6.58 p.m. I waved a huge white sheet, and Rolls seemed to alter his course towards me. He passed the coast at 7.5 p.m., and went on inland for three miles, then turned round and went north-west, apparently to fly down the Channel. He kept at a height of over 1,000 feet, his Wright aeroplane at that distance having a peculiarly fragile beauty. Some anxiety was caused by the fact that no torpedo-boat was in sight, but slowly the aeroplane shaped a better course, and I then ceased to signal.

It was evident Rolls intended to surpass M. Blériot and M. De Lesseps by making a double journey, and it was a proud moment for us English. The French spectators were enthusiastic, for they realised that a double crossing of the Channel was a great achievement.

Besides signalling Rolls I had to send a report to the *Times*. This I did, and was astonished to see the following in the *Star* the next day!

"The Calais correspondent of the *Times* sends a description of what he saw of the flying Rolls. Without any alteration of the diction, it might be set forth in Whitmanese lines, paraphrasing the words of the prophet of Iddo's line in King

Darius's day, 'Then I turned, and lifted up mine eyes, and looked, and, behold, flying Rolls!' Thus:

With our binoculars glued to our eyes,
We watched the airman's progress.
It was a fascinating task.
There was the great expanse of sea and sky. To the right a cluster of
Warships marked the scene
Of the Sunken submarine*
And the operations for its salvage, a saddening and gloomy reminder of the perils of the sea.
A dazzling sun cut a path of burnished brass to the horizon.
The heavens were alight with the tenderest hues of green.
Blue,
Orange,
Mauve.
There was a curious rainbow effect on cirrus clouds.
High in the west, and, right against it,
There was the aeroplane speeding to its goal,
Alone in the great expanse.
Our hearts trembled at the thought of the vagaries of a motor.
There was still no sign of the torpedo-boats that were to attend the flight.
Mr. Rolls's course
Was clearly too westerly.
For half-an-hour he could be seen by the naked eye, but with binoculars, until 7.53,
We clearly saw him for 45 minutes of his return journey.
At length the aeroplane became the merest speck 20 miles away.
We believed we saw him descending.
Towards the end his course took him nearer
The crimsoning glory of the sun, and he vanished finally
Under a haze."

* A French submarine had sunk two or three days before off Calais with the loss of all hands.

Needless to say, when I spelt out my message on the French telegram form, nothing was farther from my thoughts than Whitman's, or any other poet's style!

After this double crossing by Rolls the Channel was flown repeatedly between 1910 and 1913; on the occasion of the European Circuit eleven machines crossed in one day.

The crossing by the late Lieut. W. B. Rhodes-Moorhouse, V.C., was a notable event in August, 1912. He flew across from Douai to Ashford on a new Bréguet with two passengers, Mrs. Moorhouse and Mr. J. H. Ledeboer. They made a bad landing, and the machine was wrecked, but it was the first time that more than one passenger had been carried. Rhodes-Moorhouse was one of the best fellows I ever met, and had a deep place in the affections of all his fellow Aero Club members. Although his small figure and thin face with its frequent quizzical smile, and his light voice, gave no indication of the great spirit within, he was one of the bravest. He was killed early in the war, and the circumstances were such that a posthumous V.C. was awarded, this being the first Royal Flying Corps V.C. awarded. He had bombed Courtrai Station, and had stopped a big German movement; but it was necessary to tell H.Q. what had been done, and although badly wounded he flew back, when he could have courted safety by descending within the German lines. Bleeding to death he carried on, made a perfect landing, delivered his message, and collapsed.

Flying the Channel in the early days was a very different affair from what it is to-day, certainly a much more risky business. Motors were not too good; compasses—not often carried—were most unreliable, and had rarely even been adjusted, and there were no weather forecasts of any real value. My first crossing by aeroplane from the French side was in June, 1913, when I was the passenger with Gordon Bell, who had gone to Buc, near Paris, to receive a new Borel monoplane—80 h.p., Gnome, which he desired to fly back to England. He had not before flown a Borel machine, but on the evening before we crossed he took the machine up twice alone, and once with me. We started at 4.30 the next morning. The machine carried a load of about 700 lbs., and made light of it.

After one wide circle to gain altitude we took a northerly course; the wind was abeam, considerably reducing our speed, but otherwise the conditions were perfect. We headed straight across Versailles at a height of about 1,500 feet; Paris down on the right was hidden in mist, and we saw the rising sun above it through a maze of dancing light; the land below and to the west was clearly visible. Against the red disc of the sun the distant Eiffel Tower was visible for a few seconds, smaller than the sun. We mounted steadily to about 2,200 feet; at which height we cruised, except at the Channel crossing where we nearly trebled it.

Gradually the sun's increasing power brightened the landscape. The wind, although hindering, was steady, and the machine's motion was smooth. We could not converse while the engine was running, but when it was necessary to speak Gordon Bell cut the engine off for a few seconds, and while we planed down a few yards we talked. For certain things we had signals. I had little to do but watch a gauge and keep an eye on the course. We passed notes to each other occasionally; for example, Gordon Bell found it easy, while piloting the machine, to write, "This is Meru? How far have we come, and in how many minutes?"

But it was not all plain flying. We flew into a region of small woolly clouds. They became larger and more numerous, and soon we were enveloped in mist. We descended to about 500 feet, and even then the land was barely visible. We could not follow the route; and, after a little while, steering by compass became too inexact. So we landed in a large field, where were some harmless-looking beasts, who, however, immediately surrounded the strange invaders from the skies. They turned out to be young bulls of a most inquiring frame of mind, and for five minutes we defended the machine against thirty of these youngsters, who were indifferent to hard turfs, even when struck on the nose. Then farm labourers arrived to help us.

A little later the mist cleared, and we prepared to start away. To get out of the field we had to taxi along the upper half of it, turn a semi-circle, and then gather speed for the ascent. The moment the machine started the herd of young bulls came in pursuit, heads down, tails up. We turned to the left, and they promptly began to try and head us off, but our speed was too much for them, and we got up and away.

It was only clear for a little while. At seven o'clock we came down at a small village, Thieulloy l'Abbaye, where we stayed for about an hour, and at half-past nine we came down again, finding a resting place in a clover field. To our amazement we discovered we were at St. Valerie, nearly fifty miles from the part of the coast we had intended to reach. Here we waited on the edge of the cliffs, the centre of an admiring, but malodorous, throng of villagers, for four hours.

Glad enough to get away we were, but it was not until 2.30 that we left the tangled clover and hillocky ground, taking off without trouble.

We had arranged beforehand to land at Le Crotoy, at the mouth of the Somme, where the Caudron seaplane school was situated, and to reach there we had to fly along the coast, past Dieppe. Away to the left the sea was hidden under a rolling blanket of mist, which ended sharply at the coast; below, on the right, the French country was in bright sunshine. The wind was rather helpful, and we reached Le Crotoy in forty minutes—for fifty miles not bad going.

At Le Crotoy we found friends, Mr. J. D. Chataway among them, who kept us talking for an hour and a half trying to dissuade us from attempting the Channel crossing, and filled our tanks with sufficient fuel for four hours' flying. As to crossing, we had open minds. If, when we got near Calais, we found the Channel clear and the motor running sweetly we thought we might attempt it; otherwise we could come down at Calais, where was one of the numerous sheds provided by the French National Fund. We left Le Crotoy at 4.40, and continued along the coast, passing Boulogne and the high land beyond in excellent time. As we neared Sangatte and Calais we climbed to 5,600 feet so that a more extended view could be obtained and a bigger range for a glide down in case of trouble.

Half-way over the Channel the cap of the petrol tank in front of me blew off and whirled close past Gordon Bell's head. Instantly we were drenched with petrol, and I had to keep my hand, half frozen, over the aperture for at least twenty minutes, by which time the tank became less full and its contents were not so easily shaken out. The roar of the motor and the whistling of the rigging alone told the story of our progress. So far as the view went we appeared to be hovering in mid-air.

Imperceptibly the view opened out until we could distinguish tiny lines from the English coast indicating Dover breakwater and pier. The sun was shining through thin clouds. We saw more and more of England, until, when half-way across, the coast from Hastings, round the Nore and up the Thames Estuary, probably to Tilbury, was visible. Kent lay before us, a dusky, grey patch. Beyond, the Thames gleamed yellow silver under the sun, and down Channel the sea was nearly white.

The only need for anxiety was the obvious slowness of our progress. With our machine in a calm we could have crossed in less than twenty minutes. Clearly the wind was stronger than we had thought, probably accounted for by our higher altitude. Far away in the west it seemed that the mist was increasing and coming towards us. Should we get across before clouds enveloped the Straits?

Altogether our sea trip was thirty-two or thirty-three miles. We intended to cross a little to the east of Dover, but our drift was greater than we anticipated, and at a great height it was impossible to estimate the amount of drift except after prolonged and careful observation.

We left Dover far to the west and passed over Walmer and Deal. Then we came down rapidly to a lower altitude, finally crossing the English coast at Pegwell Bay, south of Ramsgate, one of the small sections of the coast open, according to Home Office regulations, to the aeronaut provided he had duly notified the authorities beforehand. Now we came in for the worst trouble of the day. We ran into two or three violent eddies while flying along the north coast of Kent, and were tossed about considerably. Kent looked very verdant and inviting, but we had decided to come down for the night at Eastchurch, which for half-an-hour had been visible in the far distance. The fates were against us, however. At 6.30 the engine stopped dead. I thought Gordon Bell had switched off, and was amazed when we headed steeply down and the engine remained silent.

But as we descended swiftly and steeply I realised that a landing was intended—indeed, unavoidable. And here the pilot's skill did him good service. There was plenty of room to land in, but of all the available fields one was the best. It was for that one that Gordon Bell steered, although it involved a bit of "trick" flying.

We had been touring by air since 4.30 a.m., and had spent six hours forty-six minutes aloft, covering a distance of about 300 miles, most of which had been against a strong wind.

We carried copies of a special aeroplane edition of *Le Matin* addressed to the Lord Mayor of London. These, it will be seen, arrived rather later than the ordinary copies sent by train and boat!

The following is a list of cross-Channel flights up to the end of 1911:—

1909	Louis Blériot
1910	J. De Lesseps
	C. S. Rolls (double crossing)
	J. B. Moissant
	J. B. Moissant (second crossing)
	T. O. M. Sopwith
	C. Grace
1911	
July 3	J. Védrines
	Vidart
	"Beaumont"
	Kimmerling
	Gibert
	E. Renaux (with passenger)
	R. Garros
	M. Tabuteau
	Barra
	J. Valentine
	Train
July 4	Duval
July 6	J. Védrines
	Gibert
	Kimmerling
	"Beaumont"
	Vidart

	M. Tabuteau
	E. Renaux
	Barra
	R. Garros
July 8	O. C. Morison
Aug. 4	J. Védrines (Hendon to Dieppe)
Aug. 13	J. Radley
Aug. 27	Pourpé
Aug. 28	Pourpé
Oct. 12	Gustav Hamel

CHAPTER XIII

LEARNING TO FLY IN THE OLD DAYS

Soon after my first passenger flight in an aeroplane an opportunity occurred for me to qualify for the aeroplane pilot's certificate. Ballooning was on the wane in Great Britain, owing partly to the difficulties under which it labours in an island country, an uncertain climate, and the cost of gas and of labour. I had not even troubled to apply to the Aero Club for my balloon "ticket", and in fact did not do so until after the War, so that my number on that list is 278.

There were at this period three or four centres of aviation, notably Brooklands, Hendon, Eastchurch, and Salisbury Plain, but the biggest "school" of flying was the one established about this time at Lark Hill, near Amesbury and Stonehenge, on Salisbury Plain, by the British & Colonial Aeroplane Company, which later became the Bristol Aeroplane Company. This concern was established by the late Sir George White, one of Bristol's most enterprising and wealthiest business men, and he soon gathered about him a staff of experts on aviation, including Captain B. Dickson, D. Graham Gilmour, Mr. J. J. Hammond, Mr. Sidney E. Smith, Mr. Archibald R. Low, Mr. G. H. Challenger, C. P. Pizey, Mr. Leslie Macdonald, Mr. Archibald Knight, and others. As instructors he had secured well-known French pilots, for at this time there were not enough British pilots of this class to enable an ambitious scheme, such as that of Sir George White, to be started. The Frenchmen were M. Maurice Tétard, L. Versepuy, M. Maurice Tabuteau, and M. Henri M. Jullerot, who at the time I joined the school was flying an aeroplane in India in connection with Indian Army manœuvres, but returned to England before I left the plain. M. Tabuteau had flown across the Pyrenees. He was the winner of the Michelin Cup for 1910 with a flight of 360 miles. In the following year he was to make world records for various distances.

Soon after the opening of the school on Lark Hill a number of newspaper representatives were invited down to inspect it, and I went with the party. That was on February 2, 1911, and it is a date ever memorable to me on account of a flight I had with Mr. A. R. Low (now Major Low, Librarian to the Air Ministry). This was only my fourth or fifth time up in an aeroplane, and I was eager for such experiences, and in a fever lest there might not be time before we had to leave to catch the train, or that some untoward circumstance might interfere: engines were very fickle in those days. Well, Low took me right over Stonehenge, and in view of other traces of ancient races and of the Roman occupation. But what I did not fully realise at the time was the exceptional character of the experience in another aspect. The pilot was a scientific man whose mind follows mathemetical roads where only the more erudite can follow him. I do not suggest he ought never to have flown, or that the time he spent on that practical work was wasted. He was a very good pilot, but later he was able to perform the services for aviation for which he is peculiarly fitted. There is little difficulty in finding the material out of which good pilots can be made, but men with the intellectual gifts of Major A. R. Low are rare.

Before we left Salisbury Plain that day I had almost fixed up a date on which to join the school and learn to fly. I was forty years of age, but that was not regarded as an obstacle. I was keen to become a practical aviator, partly because my ballooning had made me eager for aeronautical experiences, partly because I was convinced flying was the biggest thing that had ever happened in mechanical development, and partly because I was writing about it and could do my work better from personal knowledge. Besides, it would be something to be the first journalist to possess the aviator's certificate.

At that time I was writing both for the *Observer* and the *Field*. It was easy to arrange to do my work while I was living at Amesbury and learning to fly, and experiences as a pupil would give me a good topic. I was on the Plain for nearly three months.

I arrived at the George, Amesbury, on the night of Sunday, February 19th, and found the place almost monopolised by the flying men, the staff of the school and the pupils. M. Tétard, in morose mood because of the cold and the high wind, which made flying possible only when you were lucky just at dawn or at sunset; Versepuy volatile and gay as he always was, a diligent picker-up of English words; and how proud he was to lisp a popular music hall ditty of the day! H. R. Fleming, my senior as a pupil by one day, was there, and two other pupils were expected. Collyns Pizey arrived on the following day.

Every morning instructors and pupils drove up to the sheds on Lark Hill in a lorry, and morning after morning the conditions were quite hopeless on account of high wind and, usually, rain. After breakfast at the George we went back to the sheds and listened to Pizey while he explained the Gnome motor to us, or we lent a hand at any repairing job, even stripped the fabric off a wing and replaced it in order to know how it was done; but, more important than all these, we used to sit in the pilot's seat of a machine, and operate the controls, thinking out all the circumstances, going through a flight in imagination, while Tétard, or Pizey, or Versepuy told us how to do it.

In a corner of one of the sheds reposed a stretcher, and Fleming and I, as the senior pupils, solemnly took the new arrivals, Mr. R. W. Philpott, Edward Hotchkiss and Leslie Stephen, R.G.A., and later on Lieut.-Colonel C. O. Smeaton, R.A., to see it the moment they turned up at the school. That was a stock joke. H. M. Maitland, brother of the late Air-Commodore Maitland, arrived later; but he was not a new pupil. As it happened, the first use of that stretcher was for him, when he crashed and broke both thighs, as shall presently be told.

Before coming to the flying part of the story I would like to try and recall the " atmosphere " of the flying school. We were really a happy family, but not always without our troubles, although these, I think, were largely due to the enforced waiting for weather. For twelve days after my arrival it was impossible to make an ascent. The thirteenth day, Friday, the 3rd of March, was a good day; and M. Tétard was away at Bristol with Versepuy, so that the opportunity was missed! On the following Sunday, we had good flying weather, but the machine was unable to go up on account of the obstinacy of its Gnome engine, and it was not until the afternoon of that day that flying began and Fleming and I had our first instruction in the air.

The boredom of those weeks of bitter winter on the Plain would have been excessive had we not made amusements. How we hated the roar and rattle of the wind over the sheds. We used to go into Salisbury in the evening, and occasionally on an afternoon when it was quite useless to go to the sheds, and at Salisbury we had the run of the roller skating rink. We played hockey on skates there, but most of us cut anything but graceful figures on wheels, although I must except Hotchkiss, who had almost the professional style. M. Jullerot and I (I try to persuade myself) were of about the same level, a level far below the average. So we played hockey, and on a famous occasion, "billed" all over the town, the Flying School "drew" in a match with the skating rink staff. Possibly they made some sort of handicap of it; but I forget the conditions. We used to get some hard knocks at hockey, from the sticks, from the ball, and from the floor. The floor of the rink was remarkably lively to some of us poorer skaters. Fancy-dress skating carnivals were held. M. Jullerot assured us skating was more dangerous than flying!

All this helped to keep us fit, as did the football we played about with on the hill, sometimes when the ground was covered with snow. Fleming and I took long walks. He was an extraordinary versatile fellow. He could juggle, and do all kinds of legerdemain. I have seen him lie on his back and, while balancing a chair on his chin, play a mandoline, something about bringing somebody violets every morning.

The establishment of the flying school had a somewhat disturbing effect on the village. We did not close down on Sundays, and this no doubt was a shock to many of the inhabitants. Crowds used to come to the hill on Sundays. One Sunday—it came to our ears afterwards—a Bishop holding a Confirmation Service felt compelled to utter a warning to the young people of the place, and apparently he felt that our influence might be thoroughly bad. He really had no solid ground for giving us a bad name, for although the Frenchmen had the dash and élan of their race, and their flying excited admiration in many a village maiden's breast, it was all quite harmless. At any rate, one of the pupils who had come from a village in a neighbouring county, and dutifully intended to link up with the local vicar and establish the conventional bonds, called at the vicarage and ventured to utter a modest protest against the Bishop's judgment. I sympathise with both parties!

The flying brotherhood were regarded rather as heroes by the boys and girls, and we were besieged with visitors at the George, the girls—schoolgirls home for the week-end, some of them—invariably bringing their autograph albums for us to sign. I will not deny we were gratified. Who would not be? Vanity! Vanity! Often I wonder now, after the lapse of sixteen years, a period covering the great war, when Salisbury Plain became a vast camp, and Amesbury was quite a war village, where those albums are now. The autograph album is one of the pleasant things killed by the war. Some of the autograph collectors no doubt went to France, and not all of them returned. Others doubtless are widows, for there was much early marrying and giving in marriage in 1914–1918.

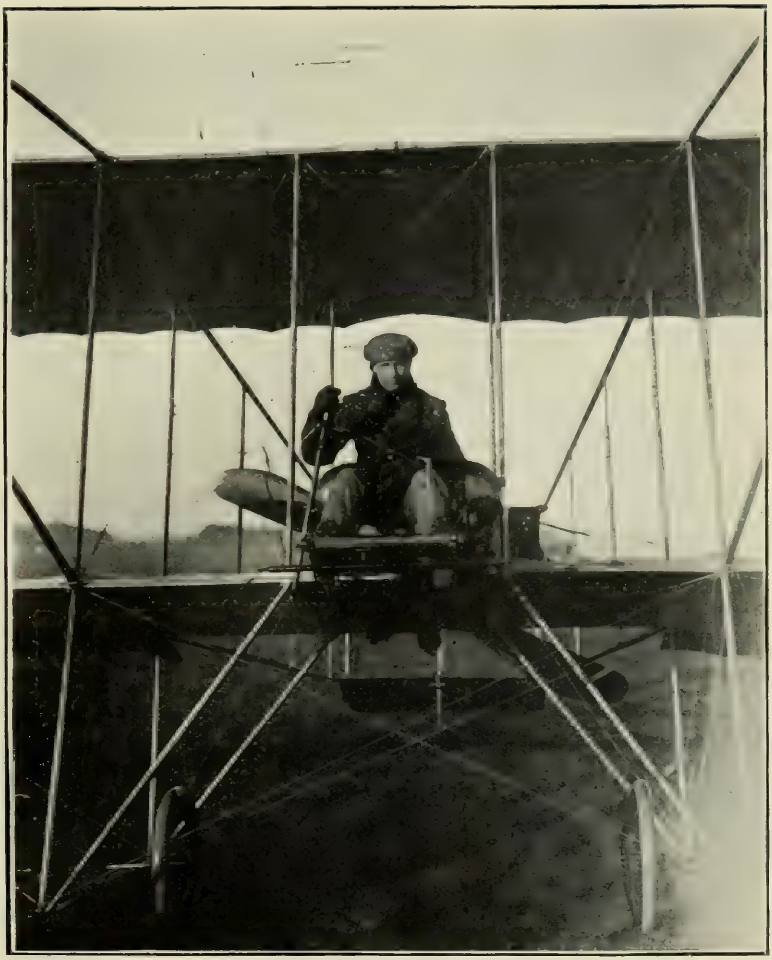
Apart from our flying school there was notable intercourse with famous flying men on the Plain. At Lark Hill Mr. George Cockburn had a shed, and in that shed was the first Farman-Gnome aeroplane, or nearly the first one. He was considered by many people almost crazy to choose such a locality as Lark Hill, for it was not the flat smooth aerodrome considered at the end of 1909 to be necessary for flying. But the Plain had the merit of providing plenty of space for forced landings, and that was an advantage at a time when forced landings were pretty common. It may be mentioned that opposition to the building of sheds on Lark Hill was made on the ground that they would obstruct the view of the sunrise from Stonehenge on Midsummer Day, and that since Druidical times it has been the custom to regard the ceremony of watching this phenomenon from this place as a rite. Accordingly a gap was left between the sheds, and this gap became known as " Sun Gap ". It proved a blessing in disguise, and when I was taking my ticket I should have had much greater difficulty during the series of figures of 8 imposed by the conditions if it had not been for the " Gap " which I was able to fly through.

We pupils sometimes visited Mr. Cockburn in his shed, and stood in a semicircle round his machine and its Gnome engine, and listened to his discourses. These, however, had to be wrung from him by diligent questioning, for he does not belong to the talking tribe.

On the afternoon of Sunday, March 5th, Fleming and I had our first instructional flights with M. Tétard, who permitted us to lean over him (he only took one of us up at a time, of course) and rest our right hand lightly on his in order to feel the movements of the "joystick" which controls elevator and ailerons. Versepuy went up in the Bristol-built Farman fitted with an E.N.V. engine, but it was unsatisfactory owing to some engine fault, and he was flying distinctly tail-down.

On the following day there was a lot of flying, and M. Tétard was out with Mr. Herbert Thomas for three-quarters of an hour. Mr. Thomas, I ought to mention here, was Britain's youngest aviator at that time. He was a nephew of Sir George White, and he had taken his "ticket", No. 51 on the Aero Club list, only a few weeks before. He is still in the family firm, and occupies a position of high responsibility in it. Most of the time I was at the school he was with us at Amesbury, and all the pupils were much helped by him.

Versepuy, I should have said, was the pilot responsible for the machine with the E.N.V. engine. There is no doubt that this was more difficult to fly than the Gnome-engined machines



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most of us used, and Maitland who was to fly the E.N.V. had all our sympathy. Very seldom was the experienced Versepuy able to fly it with confidence. The engine was on the heavy side, and this, in the type of pusher biplane in which it was fitted, meant that directly there was the slightest falling off of power the tendency for the machine to get tail-down was hard to control. That, of course, was the risk with all the old pusher biplanes, but a heavy engine aggravated it. Versepuy was one of the only two or three pilots who ever flew the Santos Dumont "Demoiselle" monoplane. Versepuy, indeed, was said to be the only pilot who had ever made a gliding descent on the "Demoiselle". Other references to that extraordinary machine will be found in their proper place.

We had all sorts of difficulties in those days. On Sunday, March 12, M. Tétard took me up for a flight, but the engine was doing badly, and we could not get a proper lift. We careered about the Plain in a series of hops like a kangaroo, and every moment I expected the undercarriage would smash. However, we got back with nothing worse than a broken stay. Nowadays it is difficult to imagine circumstances in which such a flight would be made.

The famous M. Maurice Tabuteau arrived about this time, and I had many flights with him. He went in for such stunts as were possible on the old pusher biplane, one of his favourites being a descent *en cheminée*, a spiral regarded in those days as a steep one. It was considered remarkable for a pilot to take his hands off the stick, and M. Tétard and M. Tabuteau often did it to inspire us with confidence. Meanwhile the weeks were passing, and we were gradually getting accustomed to the idea of flying, and were looking forward with mixed feelings to the day when we should be entrusted with a machine to make our first solo.

About this time the conditions for the granting of pilots' certificates were changed. Until February 15, 1911, a pupil had practically nothing to do beyond making two or three flights, landing near the starting place, and all the conditions were extremely easy to fulfil. Or rather one would say the conditions were suitable to the times and the machines, for in those days it was the rule rather than the exception for a pupil to teach himself to fly. There were no dual-control machines; and really very little was known about flying. The new conditions were somewhat more severe, although far less exacting than those of to-day. Under the rules to which we pupils would have to conform we should be called upon to make two flights, each consisting of five complete figures of 8, each flight at least five kilometres, and one altitude flight in which a height of at least fifty metres was to be attained. In alighting from each of these flights the motor had to be stopped at or before the moment of touching the ground, and the aeroplane brought to rest within 50 metres from a point indicated beforehand.

Promptly, in airman's parlance, "the wind was put up" us, and our French instructors were responsible. They assured us that the right-hand turns which came into figures of 8 would prove extremely difficult in pusher machines fitted with rotary engines, on account of the gyroscopic effect of the rotating mass of the engine. They pointed out that on such machines the right-hand turn was very rarely made; and they certainly displayed very great reluctance to make such turns for our benefit. The effect, they said, was a powerful tendency of the machine to lift its nose directly the right rudder was put on, and the only possible way of overcoming it was to get the head of the machine well down before ruddering. Even then there would be a strain on the controls. It was possible, of course, to make the turn on a very wide radius. We became almost convinced that we should be unable to get our certificates until either the conditions or the machines were changed, and we were in some distress about it, for life at the school one way and another was expensive and not one of us possessed means enabling us to ignore the passage of time whilst learning to fly.

One day Graham Gilmour flew over to the school, I think from Brooklands, accompanied by Mr. Gordon England, and he had a look round at things generally, and asked us how we were getting on. We told him about our fears, and he immediately ridiculed them. That evening, after dinner, he went into the matter with us. He assured us that the effects of the right-hand turns described were 99 per cent. psychological. Pilots had imagined a vain thing. They had talked about the matter, and got into a funk about it; and the result was, when they went up and tried the right-hand turn, they really did believe the machine was playing strange tricks. He assured us that the rotating Gnome engine could not have enough gyroscopic effect to make any serious difference; and, true to his word, he went up next day and with Gordon England made repeated right-hand turns. Since then I have wondered whether the Frenchmen were not "pulling our legs," at any rate to some extent.

While we were learning, many interesting things were happening in aviation, and some of them under our eyes, or above them. Long ago as that was we were experimenting with wireless telegraphy from an aeroplane. Mr. Thorne Baker attached a transmitter to a Bristol biplane built for the Russian Government and tried it on the Plain. The transmitter was without the ordinary aerial, but long brass tubes were attached to the wings. It was supposed to have a radius of about 12 miles. Only partial success was achieved.

One day we saw the great Tabuteau get " wind up " in a flight he had with M. Tétard piloting. There was a high wind, and the airman had quite a battle with it, being swept down on one occasion in what looked like a bad side-slip almost to the ground. When they got out of the machine M. Tétard was laughing, but M. Tabuteau was grave and reserved. Of course it is always a trying experience to a pilot to be taken up as a passenger, even in normal conditions.

Now we heard that the first certificate in England under the new conditions had been taken, and the successful pupil was Mr. Lewis W. F. Turner, who had qualified on a Farman biplane at Hendon. And the next " ticket " also was taken at Hendon, by Mr. Ridley Prentice.

During this time of very varied weather and long waiting for opportunities for flight many distinguished visitors came to the school, chiefly Government and Army officials from foreign countries and the Dominions. One week-end most of us went home to London in order to see the Aero Show at Olympia. On the following Thursday the school was visited by calamity. H. M. Maitland, who had been doing good flights in the E. N. V. Bristol, decided to attempt a right-hand turn. He got away nicely, and made a quarter turn to the right, and then straightened out. Then he began to turn to the right again, and we could see he was getting somewhat tail down. M. Tabuteau began to look worried, and indeed we saw that a fall was inevitable, for the tail got more down and forward speed was practically nil: the machine was stalling. We did not wait: some of us ran towards the spot, others had the forethought to get the stretcher out. Maitland fell about fifty feet, hitting ground with the right side of the elevator and right extremities of the wings. We found him fortunately clear of the engine, but hemmed down with his legs bent under a spar. He was conscious, and we soon had him out and on his way back to the sheds. A doctor had already been summoned by telephone. It was found that both thighs had been broken, and the doctor set about his task with a very cheerful patient. We took watch, turn and turn about during the night, and in the morning my old friend, the late Captain (afterwards Air-Commodore) E. M. Maitland and his sister came down to Amesbury and arranged for their brother's removal to London.

The queer part of the business was that H. M. Maitland's accident occurred within a few hundred yards of the spot where his brother had a somewhat similar accident about a year before, breaking both ankles, and Captain Maitland was still very lame when he came to Amesbury to see his injured brother.

Fleming and I knew that we were nearly due for solo flights. We felt we could do them, but we confessed to nervousness. I believe that had it not been for Maitland's accident we should have made them that day, or the next. As it was, we were given one or two more flights with instructors. And on one occasion M. Tétard went out on a long cross-country flight, when it came over foggy, and he lost his way. He made several landings, and took up local people as passengers to show him the way. They were only too glad to do this, and were quite willing to go home by train.

My opportunity came on Tuesday evening, April 11th. Fleming happened to be away. He had been getting rather " fed up " by delays and, as luck would have it, I got my first solos in before he did; out of my turn, of course, but that was his fault. Mr. Gordon England had been making some good solos, and then, just as I was fearing dusk would come before I could get even a passenger flight, M. Jullerot came to me with a smile and said, " Now then, C.C., off you go."

The pupil of to-day does not experience, but doubtless he can imagine, what it feels like to be put in charge of an aeroplane for the first time, and when you have never had your feet on the rudder control, and only know it by theory; when your only practical acquaintance with flying is that of sitting behind a pilot and holding your hand over his. You know where the switch is, and the petrol tap, and throttle. There were no instruments, not even an air-speed indicator, not even a revs. counter (we used to make a rough computation of the revs. by counting the throbs of the head of oil in the oil gauge!)

The mechanic starts up the propeller and you hear your own voice say " Contact ", " Switch off ", " Contact ", " Off ", until the propeller runs and the mechanic steps back. You know the moment has arrived, and you have got to raise that right hand of yours as a signal to the mechanics who are hanging on to the machine to let go. And then there is nothing for it: you've either got to attempt that flight, or else to switch off, turn off the petrol, step out of the machine and say that on the whole you think you had better give up this silly idea of flying. Well, of course, you cannot do that.

Up went my right hand, and the machine began to move forward. I managed to keep it straight, and the business had been so well drilled into me that at the right moment, when I could see the ground sweeping past at the usual rate, I kicked off with the very slightest preliminary depression of the elevator followed by an instant pulling back of the lever. The machine was off the ground; but good heavens! I was not going straight! Wobbling from left to right and right to left! After all, my hands were the hands of a clodhopper; and there was the end of the ground: I had got to come down somehow from my lofty thirty feet or so! I switched off in panic, and came to a stop on the ground, looking about me in bewilderment as I realised that I had not wrecked the machine. There I waited for the arrival of the doubtless agitated and mocking school and an indignant Jullerot. Instead:

" Very good, old chap. Now we'll turn you round, and you must do it again." Phew!

I kept straighter at the second try except for a tendency to charge into the sheds: and still my sensations were wildly confused, and I did not believe I was learning anything, in spite of M. Jullerot's assurances.

And what a night I had thinking it over!

Next morning we were up on the hill early, and I was soon given my chance. Now, strange to say, I felt quite at home, and made a complete turn, of course with a big radius, but finishing up with a good landing. The second time I was up to 200 feet and, the air getting bumpy owing to the sun on the cold wet earth, did some interesting work in small eddies. Also I had, for me, an alarming experience. My glove caught the switch accidentally and the engine stopped while I was nearing a fence. Somehow I did the right thing: put her head down and switched on, when she immediately picked up. After that I did not seem to mind anything.

One morning I had an unpleasant experience. M. Jullerot and a passenger went up in the early morning, and were obliged to come down owing to fog. We heard the distant motor stop, and went out rather uneasily to find them. They were all right, and we waited by the machine for the fog to clear. They had landed on rather rough ground; mole hills and clumps of heather. But to my astonishment M. Jullerot, as soon as the sun came through, told me to fly the machine back to the sheds.

I got off the rough ground all right, and was soon sailing over and waving my hand. There were some visitors, I remember. Then the fog came down, and I was absolutely all at sea in it, with no sense of locality of direction, and only able to tell by the feel of the machine whether I was keeping flying speed. Happily I could sometimes see the ground faintly, and this helped me a great deal; but after two or three minutes I was completely lost. I hoped the fog would clear in patches, and that I should be able to land in one of them; but chiefly I was anxious to keep away from that side of Lark Hill where there was a quarry and much rough ground ending in the wooded valley and farms. I had to keep the closest watch out for the sheds and other obstructions, and I was scared almost out of my wits when I suddenly saw the quarry below the machine, and me with scarcely enough altitude to clear it. A sharp turn was necessary, and then I realised I must at all costs keep altitude. But then I saw telegraph lines, one line after another, and I knew about where I was. The ground at any rate was good for a landing, and it was obviously necessary to get down, if I could, safely anywhere. But there I did an extraordinary thing. In order to make sure of my ground I took it where I could see it, and came down over a telegraph line with a steep turn, the machine answering perfectly. But in the alighting, which was without more than two or three yards forward run, one of the undercarriage skids was broken. I got out and waited. And soon I heard them hailing.

M. Jullerot was astonished, and he assured me he would lay me any odds I would not do it in clear weather. But "where ignorance is bliss, it's folly to be wise." We got the machine out of that place, however, and he flew it, broken, back to its shed; and that was a good bit of work, not without its risks. Also he congratulated me, saying:

"No pilot is any use until he has broken wood!"

Some days we did a lot of flying. I remember that one machine made 61 flights in four days. Soon Fleming and I were practising figures of 8; and undoubtedly there was a slight resistance to the right-hand turn. It amounted to this: you had to hold the head of the machine down as you made the turn, and you felt all the while that if you did not take care the bus would get tail-down.

Fleming and I went up for our first certificate flights the same evening, he starting first, and I following, with instructions to fly my "eights" at a higher level. I accordingly went up to about 800 feet, and took a little longer than he did: 21 minutes, in fact, against his 18, the difference due to the time spent in climbing higher and coming down again. On April 22, Fleming completed his brevet flights, and on Sunday, April 23, I went up for my second, Commander (now Lieut.-Col.) Harry Delacombe observing for the Aero Club. There was a little wind when I started, but no sooner was I up than it began to blow harder and very gustily, and I had quite a battle. When flying against it I made very slow progress, but coming round with the wind astern it was difficult at times to keep the machine from descending and landing, for the following gusts kept lifting up the tail. Also I am confident—and I explained the theory at a later date in the Journal of the Royal Aeronautical Society—a head wind does tend to lift an aeroplane slightly and a following wind to depress it, and this despite the fact that an aeroplane's motion relative to the air is irrespective of any wind, and that "wind is but a body of calm air in motion". In fast machines the difference is imperceptible, but in the old box-kite types there seemed to be a difference; and I ascribed it to a peculiar construction of the pulsations of the wind, by which I mean not only gusts, as we know them, but, also almost imperceptible pulsations, tiny irregularities which no anemometer records, but whose combined influence is felt on the machine. I believe these minute gusts are more abrupt at the onset than at their trailing away, in fact, that the air crowds itself up in front just as does the head of any fluid in a pipe, or dust in a gutter. I cannot prove it, and eminent meteorologists tell me they have no record of such wind structure; at the same time they admit the possibility. So, as I say, I had a job to keep the machine's head down when on the up-wind stretches, and hard work to keep her off the ground on the down-wind stretches, and especially when turning down wind, an operation calling for care. Each time coming round towards the sheds on the completion of an 8 I had lost so much height with the wind behind me that I was under the brow of the hill, out of sight of the crowd which had assembled on the ground, and I had to come round through Sun Gap. Twenty-five minutes it took me, and when I landed the machine never moved a yard.

M. Jullerot was delighted, and Col. Delacombe marked on his report that he had never seen a certificate flight made in more difficult conditions. And so I reluctantly returned to London, for I had said that after getting my ticket I would not continue flying.

My certificate was dated April 25, and it is No. 70 on the Aero Club list. I had stood aside to let Mr. Gordon England take his ticket before me, and Fleming of course was senior at the school, and got No 69.

But they say you never do anything for the last time; and in the summer of 1912 I was at Brooklands trying to fly a Deperdussin monoplane fitted with an Anzani 25 h.p. engine. Alas, the oil splashed so continually over my glasses that I was helpless, and decided it was positively dangerous. That type could only be flown by people who were not dependent upon glasses. I had one adventure before I gave it up. Fleming was then flying at Brooklands, and one day while I was taxi-ing on the Deperdussin he landed just in front of me on his Bristol biplane, and he had stopped his engine completely. We were both helpless. I switched off, but the machine ran on, and before it could stop had smashed into Fleming, damaging a wing. Years after, during the war, a youthful officer, Mr. G. Dorman, arrived at the R.N.A.S. station at Roehampton and told me he saw the collision and photographed it. He very kindly gave me the picture.

Often I feel I could fly again, but since that time I have in any case been unable to afford it, for besides the actual out-of-pocket expenses the time it takes up must be considered. Still, in these days of light aeroplanes one is tempted. On the other hand, I am so dependent upon glasses—and even with them my right eye is defective—that it would probably be courting disaster. Occasionally on dual-control machines, however, it is pleasant to feel the controls again.

I believe, at that period, I was the only professional journalist in Europe with a pilot's certificate. Since the war, among the new comers, are one or two who learned to fly in the Royal Air Force. But to this day some of them have never flown even as a passenger. For that matter I knew a motoring journalist who could not be induced to ride in a motor-car!

Now I am reminded of the casualties among the batch of pupils to which I belonged. Both Fleming and Hotchkiss were killed in aeroplane accidents. D. Graham Gilmour was killed shortly after I left Salisbury Plain. He was flying a monoplane which collapsed in the air. Collyns Pizey, who went to Athens with Admiral Mark Kerr, the officer in charge of the British Naval Mission, succumbed to an illness.

Major Jullerot is now with Vickers Ltd., and he was for a time a fellow instructor of mine in the R.N.A.S. I have lost sight of Mr. Philpott and Mr. Leslie Stephens. Mr. Gordon England has done a lot of experimental flying, and had one or two accidents. He was injured in a glider accident at Itford Hill in 1922. Some of us pupils kept up communications long after we left the school.

The very morning I left Amesbury, Lt. Colonel C. O. Smeaton was hit in the head by a propeller fragment in a small crash he had—Collyns Pizey piloting. His head was slightly cut. He was, by the way, the oldest flight pupil in the kingdom, and he seemed positively proud of his wound. In August he wrote to tell me he had passed the tests. No other officer of his rank had so far obtained a pilot's "ticket". A cheery soul, whose conversation, enriched by memories of Service and travel at home and abroad, beguiled many a weary hour.

CHAPTER XIV

TURBULENT AIR

How we used to argue, and argue, and argue! Where two or three enthusiasts were gathered together, there was argument, unending, but friendly. When the Aeronautical Society was coiled up in a couple of small rooms in Victoria Street, and Mr. T. O.'B. Hubbard was secretary, working long hours for a microscopic salary, one or another of us would call to see him, and invariably, no matter what the specific occasion for the visit may have been, the conversation would turn to one of the perennial subjects for discussion. Also papers were read in the winter evenings, and these were followed by discussions. And usually some of us would carry on the discussion long after the meeting had closed, and would betake ourselves to some place where refreshment was obtainable. In such places, doubtless, many a fair dispenser of beer or lemonade must have been astounded and mystified overhearing such phrases as "angle of incidence", "inherent stability", "stalling speed," and by references to "helicopters" and 'gyropters". Men, whose names are now famous as aeroplane designers and pilots, filled as they were then with a youthful and unbounded enthusiasm, learning as they went along, laid down the law, quoting Lanchester, Duchêne, Eiffel, Langley, Soreau, Renard, Chatley, Chanute, Ferber, and a host of others. What a subject! What a vast field to explore; rather a new Continent! A few names occur to my mind as I write this: Mr. F. Handley Page, Mr. W. O. Manning, Mr. Howard-Flanders, Mr. C. Gurney Grime, Mr. R. Cutler, Mr. A. V. Roe, Mr. J. H. Ledeboer, Mr. R. P. Macfie; and I am sure I am forgetting some. That was long before big aeroplane firms were established and business responsibilities brought sedater spirit without diminishing interest and ardour. Let me recall some of the points we discussed.

There was no exact terminology of aeronautics in those days, and it was often difficult enough to come to an agreement as to the meaning of a word or a phrase. What wordy warfare has raged over the "angle of incidence" and "angle of inclination"! I would say what quantities of beer and lemonade have flowed while agreement has been sought. And I must say the lemonade drinkers were not invariably cool nor always the more clear-headed.

Even now one has to be careful sometimes to make one's meaning perfectly clear. It looked so easy; the angle made by the chord of the plane with . . . yes, with what? Should it be the longitudinal axis of the aeroplane, or with the path of flight when the machine is flying horizontally? And why the chord of the plane, when it was quite early established that an aerofoil, or shall we say "wing" for convenience, was in many cases giving lift even when the chord of the wing was tilted slightly downward or, as some would say in those days, at a "negative angle of incidence". Thus it became necessary to discuss a "neutral lift line", a line determined through the wing-section (a horizontal line of course) when the wing was in the attitude at which at a given speed it gave neither lift nor the reverse of lift. "Angle of incidence", or some term agreed upon, was necessary to employ when dealing with the erecting of an aeroplane, for the builders must obviously know how to fix the wing to the body and at some designed angle to the longitudinal axis.

Later, when instructing in Theory of Flight and Aerial Navigation during the war, I tried to reserve the term for the fixed relation between wing and fuselage, and to employ the term "angle of attack" for the constantly varying angle between the wing and the air in which it is moving. It should be remembered that an aeroplane in horizontal flight may be staggering along with the tail down, or with the tail unduly lifted, so that in all estimates of results the important thing to consider is the angle of the wing to the path of flight. However, I do not propose to renew these discussions here. Some little service was done to the cause of accuracy and clarity by the Committee of the Aeronautical Society on Terms, on which committee I sat, before the war. Later on, the work was renewed by a larger Committee, which was able to delve deeper and to cover a far greater range. Still, much remains to be done in this field.

One of the earliest controversies arose from the inability of the average man and the average writer to clear his mind of all prepossessions when he came to aeronautics. There was, for example, a tendency to adopt nautical terms, and this tendency led to the unfortunate use of the term "tacking" in connection both with airships and with aeroplanes. Evidently it was assumed that aircraft were in the same case as sailing ships, and the entirely different conditions which regulate the motions of air and sea craft were ignored. A sailing ship has its keel in the water and its sails in the air, and its speed and direction of travel are due to the play and interplay of widely different forces. A sailing ship cannot move right into the teeth of the wind, but it can be "trimmed" to move not merely at right angles to the direction of the wind but even "nearer" than that. Thus it can approach nearer and nearer to its destination, but from different directions. By a succession of "tacks" it can be brought to its destination in spite of a contrary wind.

Air-craft, on the other hand, are entirely immersed in the medium in which they travel, and are in the same case as a submarine totally immersed, or a ferry boat which, unless provided with sails, presents but little surface to the wind, and that surface fixed. All such craft in order to reach a destination against the wind must depend entirely upon their propulsive power, and if the destination be directly against the wind their speed of travel is thereby reduced. In the case of sea craft the current is that of the comparatively slow-moving water, but aircraft have to contend with very much faster currents, namely, the winds. The quickest way to get to a point against the wind, or when the wind is not blowing directly along the course, but at an angle to it, is to head the aircraft so that whilst it points in one direction its path of travel is in another direction and makes a straight line from start to finish. Its case is precisely that of the ferry boat crossing a swift stream. The experienced boatman heads his craft at some point on the opposite bank far up-stream, and steadily rows, and his boat crosses in a crabwise attitude straight across the stream, but always pointing more or less up-stream. The experienced airman when setting out on a journey with a more or less cross wind, first calculates his compass course, taking into account the factors of the air-speed of his machine and the speed and direction of the wind. This is a very simple calculation to make, and it enables the airman to head his machine to the degree of the compass circle which will enable him to reach his goal with the least possible expenditure of time and fuel.

One of our most prolonged controversies was raged over a contention put forward by somebody who happened to be in the public eye at the moment that speed increased stability in the air. This was one of the first examples of the danger the public fall into of assuming that an airman who has just made a big flight is necessarily an authority on all matters connected with flying! Anyway, a distinguished pilot remarked to an interviewer that with the increase in the speed of flight machines would be less subject to the disturbing effects of gusts. It was true, of course, that a very fast machine will go through a gust with no more than a tremor or a kick, whereas in the same gust a slow machine will roll and pitch; yet the roll and pitch might be very much safer than the slight kick, and the disturbance to stability actually less.

Some of the most unstable machines have been fast machines, and some of the most stable have been slow ones. But that fact realised, another controversy sprang up. What was meant by stability, and was it desirable, and ought an aeroplane to be so designed as to have complete inherent stability so that the pilot could fly with hands off?

The aeronautical world has clearer ideas on these subjects nowadays, but at the period of which I write there were orthodoxy and heterodoxy, and almost the passion which surrounds religious arguments was evoked. Later we were to discover it was perfectly easy to design an aeroplane which could be flown "Hands-off", but this quality carried with it the disadvantage that the machine took charge of its flying, and that when making a landing it thoughtlessly ignored the rapid approach of the ground (which the unfortunate pilot could see so clearly) and continued the leisurely rolling and pitching which were parts of its inherent-recovery process, indignantly resisting the pilot's frantic efforts with the controls; and the result too often was a landing on one wing.

Herr Etrich, the Austrian, had built an inherently stable machine, and Jose Weiss, British citizen by naturalisation, had designed, and was trying, a perfectly automatically stable glider, Mr. Handley Page was soon to produce his stable bird-wing monoplane, and Mr. Dunne was flying his remarkable V shaped biplane at Eastchurch. But there was growing up a "school" which contended that inherent stability could be secured without the adoption of any eccentric form of wing, and that an aeroplane might look very much like the ordinary aeroplane and yet be stable.

And another aspect of the question aroused controversy, for there were some who argued that automatic stability, or rather mechanical stability applied to the types of aeroplane which possessed the quality of extreme manœuvrability, was the best solution, and that by some application of gyroscope, or some other contrivance used as an accessory on the machine, a contrivance which could be disconnected at need, the ideal would be attained.

All this time the field was overrun by cranks and charlatans who brought forward the most amazing propositions, men who knew far better than the Wright Brothers and Mr. Farman and M.

Blériot! I remember a projected machine in which a partial vacuum, mechanically produced in front and above, would give forward pull and upward lift! It seemed rather like the railway traveller who seeks to accelerate the speed by pushing against the compartment partition in front of him. And there were the wrong-headed inventors who claimed that the engine, the pilot, and the tanks ought to be placed far below the wings, thus producing "pendulum stability." Alas for them, only "pendulum instability" was thus secured, and machines built on that principle, or even with a very low centre of gravity incorporated for other reasons, were difficult to control.

There was no limit to error. I remember advocates of the vacuum airship, and even since the war preposterous claims of this kind have been quite solemnly made and have found their way into the daily press through the impartiality of editors and sub-editors, who naturally cannot be expected to be experts on every subject under the sun.

One man made the remarkable suggestion that the earth's motion, both axial and orbitical, should be taken into account in the measurement of the distance traversed by aviators. As if the atmosphere, in the lower and flyable strata, did not itself take part in all the motions of the earth! An aviator, he wrote, who flew due east would surely cover a greater distance than one who flew due west, travelling between the same points on the earth's surface.

Odd as it may seem to the post-War generation, much heat was expended in discussion on the meaning of "airpocket" and "hole in the air."

Wing-loading, power-loading, centre of pressure, centre of gravity, centre of thrust, centre of drag (it took a few years to make people call it "drag" and not "drift") all had to be formulated, and only those who took part in the flying movement in those days can realise how fascinating were the discussions, because they concerned the great conquest on which we were engaged.

Always there were the pessimists and the optimists, irreconcilable as ever.

Different flyers had different methods of gliding, or descending with engine stopped. There was the desire to descend at the flattest gradient possible, and the main care of some pilots was to get the utmost out of the machine in this respect, taking care to avoid stalling in the process. With the old pusher biplanes or "box kite" types care had to be taken to keep the tail up; with the tractor monoplanes, at any rate with most of them, the head of the machine tended to get down naturally. With all types, of course, it is possible to stall on the glide. Much discussion raged round the reasons for the different behaviour of machines in the vol plané: Why did some machines come down fast and steep; others fast and on a flat gradient; others slow and steep; and others slow and on a very gradual path? The last-named variety was obviously the most efficient aerodynamically, for it had a slow minimum flying speed, and resistance was so cut down in its design that it could attain that speed without heading down steeply. But which was the better, the flat, slow glider or the type that could glide down on a very flat angle—1 in 9, or even better—and even at that attain a high forward speed owing to good streamlining, the type in fact with great wing-loading and, therefore, a higher minimum speed? All these points are of interest to-day, and not all those who are supposed to be conversant with flying understand them. I remember the old Caudron biplane, which was very useful as an example for the explanation of theories. That was a machine which with engine stopped had to be headed very steeply down, not that it had a high, minimum flying speed which it must attain on the glide in order to avoid stalling; on the contrary, its low speed was very low, but so much resistance was offered in its structure that it could not get its minimum flying speed under gravity except at a steep angle.

These matters had to be considered in observing the art displayed by different flyers, for in some skilful hands a machine would be made to show a much finer performance than in heavy or nervous hands. We used to be astonished to see a machine weighing about half a ton float down gracefully at thirty miles per hour; nowadays we think in terms of fifteen tons, and a gliding speed of 60 m.p.h. and in many cases even more.

But we were observing progress, learning as we went along. Very early in the story I remember the discussions that waged round the mysteries of air flow over the wings, and of what really caused "lift". It was found that dust accumulated on the top of a wing in the shed was not blown away during the flight, at least not all of it, or in all portions of the surface. The explanation, of course, was the area of "dead" air, sometimes called a "partial vacuum" over part of the top of the plane, enormously assisting lift. Often in those days experimenters attached short ends of tapes to various parts of the plane in order to observe the indication of air flow.

The "tractor" versus "pusher", and the biplane versus monoplane controversies were unending, and it may be remarked that to this day there is no decision in them, for abstract theory becomes compromised the moment it associates with structural expedience. Flapping-wing machines and helicopters were much debated, and the helicopter put up a big fight even after the war, its attraction being so strong that the Air Ministry offered a big prize, and not only so, it spent a lot of money on experiments with the ideas of Mr. Louis Brennan. There was never much likelihood that the prize would be won; and, as I pointed out at the time, even if a machine had been able to accomplish the stipulated performance the helicopter would always be at a disadvantage as compared with the best contemporary aeroplane, for the reason that it would be unable to equal its performance in any respect, whilst the vertical ascent and descent would prove in practice chimerical. Thus assuming the mechanical problems solved, and vertical descent possible, it was demonstrable that the speed of the machine as it landed would be at least as great as that of a parachutist, but in the case of a machine weighing at least half a ton even so gentle a "collision" would be disastrous. The autogyro, first flown in this country in 1925, is not exactly a helicopter; it is an entirely new contrivance, and nothing like it was foreseen by the early helicopterists. Our discussions were carried on verbally and in the press, and the "files" bear witness to them. But wherever airmen and designers foregathered there was argument.

Airships, needless to say, had their champions, and in those days it was common to meet anti-airship or anti-aeroplane enthusiasts.

We reformed the Aeronautical Society. Among the younger and newer members there was a feeling that the great impulse given to aeronautics by the progress in mechanical flight made such great demands upon it that it was imperative to alter its constitution, the method by which the Council was elected, and so on. A special meeting was called and some of us made speeches to a Resolution, which was afterwards carried. This was not in the nature of a Censure Motion, and as a matter of fact the Council, as a Council, did not oppose it.

The society, which was established in 1866, and is the oldest aeronautical society in the world, possesses the finest library of its kind, besides great wealth of personal relics and souvenirs. It moved from Victoria Street to Adam Street, but is now at 7 Albemarle Street, and enjoying a much increased membership. Also the importance and value of its work have grown apace with the development of aviation.

CHAPTER XV

THE ART

It takes a generation of men to master any new mechanical contrivance. Some of us can remember the early bicycles and the timid excursions made with their aid. But in the course of a few years, assisted by improvements in the bicycle itself, the art of riding that vehicle advanced to such an extent that what were at one time looked upon as spectacular tricks became easy to any rider of ordinary nerve, whilst the youngsters seemed to take to it as naturally as if it had been in their blood. Unconscious imitation plays a large part in these matters. One recalls a time when taking the hands off the handle bars was a distinctly ventursome proceeding. Nowadays so many boys are seen riding unconcernedly without hands, and steering entirely by body balance that one wonders whether the day may not come when the handle-bar will be an optional accessory, or possibly something may be substituted for it. They may carry a wireless sender and receiver instead!

It was the same with motoring, and the improvement is due in large measure to the better design of to-day. With what confidence the driver of the motor-bus drives along a greasy city street; it seems but yesterday that he was impotent in such circumstances.

But flying introduced an entirely new set of conditions, with all the alarming circumstances of unfamiliarity. The penalty that followed mistakes was so serious that each step in the development of the art had to be taken with extreme caution. At first pilots dared not venture aloft unless the air were perfectly calm, and by that I mean not merely absence of wind, but freedom from internal disturbances, eddies almost imperceptible to the senses, yet sufficient in the early days to fill the pioneer with dread. In 1907–8 it was the rule to venture up only in perfect conditions, and for that reason the calm often observable just before sunrise and after sunset was the time chosen for flying. On dull days the air was usually favourable, but even then the airman would light a cigarette and watch the smoke for signs of movement. There were many people at that period who confidently foretold that flying would be nothing but a fair weather game, and that it could never have any practical value. I never know which is the more amusing, the unfettered fancies of him who is for ever predicting impossible things, or the daring way in which some men will deny the possibility of any development beyond the evidence of their own eyes.

In a very little while airmen found it was possible not only to fly in a strong breeze, but that it was safer at any rate on one count, that of taking-off and landing, these operations then requiring less ground-speed. Soon it was found that gusty wind could be tackled with well-designed machines, and that heat eddies were the worst condition, even for trained airmen.

One instance of the way skill in flying developed was provided by the facility with which turning movements were soon effected, aided by "banking", an operation which I believe was not seen until the Russian flyer, Efimoff, at Nice, astounded the spectators by turning a sharp corner of the course in record small space by canting his machine up on one side. He did this again, and immediately his example was copied by the other aviators. By "banking" is meant the canting up of the machine on the outside of a turn; it enables a turn to be made in a small radius safely. Before flyers studied the art of "banking" turns were made in a very wide sweep, the machine sliding away and losing distance.

In the ignorance and lack of experience of those days men were absurdly timid in some matters, or extremely foolhardy in others. Pilots of to-day would refuse to fly in the machines of the early years, which indeed would be condemned by the Air Ministry as hopelessly unstable and structurally unsound.

At first pilots made short straight hops at a low altitude, and when descending switched the engine on and off until just before alighting, when they came to a dead stop with engine off, and the mechanics had to run out and wheel them back. That was but a short phase, of course, and it soon became possible by switching on and off to turn the machine on the ground and taxi it back to the sheds. Most of the engines had but little speed, and if throttled down much stopped altogether. I believe the first descents vol plané, (in those days French terminology was used), or "gliding down" as we should say to-day, were made early in 1909; and great was the wonder they evoked, for many up to that time had supposed that engine stoppage in the air meant a crash. Then pilots stopped their engine at greater and greater heights, and some of them reaped a brief but rich harvest by including this among their stunts at flying meetings.

The first vols piqué, or steep dives, ending with sudden flattening out, were an early variant, and, as might have been expected, soon led to disasters, the machine being unable to stand the strain of the sudden check and change of angle.

Steep spiral descents with engine on or with engine stopped were common enough by 1910, but what to-day we understand by aerobatics really became a special study when the first loop was made. No particular utility for this manœuvre could be suggested, and I do not think anybody at first imagined it would one day be one of the stock tricks, useful because it gives a pilot confidence. In reality it is quite easy.

M. Louis Blériot, aided as he was in 1913 by the daring Adolphe Pégoud, was responsible for the first public demonstration of looping. He introduced modifications to his monoplane and strengthened it, and soon the thing was done. Pégoud came to England and gave a demonstration at Brooklands. His machine was the original monoplane in which "Beaumont" won the circuit of Britain race, and besides being strengthened, it had arrangements for strapping in the pilot at the waist and shoulders. Other references to the first looping displays will be found in an earlier chapter.

After that demonstration an article appeared in a newspaper:

> "Exhibition performances of this order are, in one sense, directly prejudicial to the technical progress of aviation.
>
> "Beyond the fact, already proved by Pégoud, that a specially designed aeroplane of adequate strength can survive the strains set up by almost every situation in which it could possibly find itself, they have no significance.
>
> "It clearly follows that if a pilot can voluntarily and easily turn his machine upside down, a gust of sufficient strength not only could, but would, have the same result.
>
> "While designers throughout the world are striving to attain to perfect stability, whether automatic or inherent, these exhibitions have only succeeded in demonstrating the present lack of stability.
>
> "To term a machine which has been proved to be so easily upset a 'lifeboat of the air' is not very flattering to the intelligence of the public"!

But danger was to all intents and purposes eliminated. One risk existed, however, and that was the possibility that in the upside-down position Pégoud might feel ill. Precautions had been taken by rehearsing the feat with the machine turned upside-down on trestles, the pilot strapped in his seat. It was found that he could endure this for several minutes, and in the air he had never exceeded 70 seconds at a time. This, however, opened up such a terrible possibility that it was no wonder M. Blériot was uneasy.

When I saw Pégoud it certainly seemed as if he got the nose of his machine up and then just managed to turn it over backwards and down, thus describing a vertical circle in the machine's length. Pégoud, however, said the diameter of the circle was 130 yards! The majority of the reports, while making it a "loop", were careful to explain that it looked more like a somersault; and I took the trouble to ask several aviators what they estimated the diameter of the "loop" to be. Their replies varied from 15 to 60 yards! Possibly Pégoud was himself scarcely in a position to judge, and it must be remembered that the machine was losing altitude all the time it was "looping". Needless to say, the smallness of the "loop" did not make the feat a bit less wonderful.

When it became known that Pégoud was to be imitated by British flyers a good deal of opposition was raised.

Colonel (now Brig.-Gen. Sir) Capel Holden, vice-chairman of the Royal Aero Club, when he was informed of Hamel's intention, remarked that Pégoud had come to England to give what was claimed to be a scientific demonstration, and therefore the Aero Club had not thought fit to interfere, but the moment that other people began doing "those tricks" the Club would consider the whole question and decide on their course of action. That was a perfectly right attitude at that time. The Club, however, was promptly converted to looping.

B. C. Hucks was the first British pilot to loop. He used a modified Blériot monoplane like Pégoud's. The date was November 22, 1909, a Sunday, and a wet and windy day. At his second loop he failed to complete the circle, and slid backwards. Disaster appeared inevitable, but the machine recovered its normal position. When he came to the ground, but not before he had looped several times, he explained that insufficient speed had prevented his machine from reaching the top of the loop, but that it had righted itself.

Unfortunately for the argument in the newspaper quoted above, on the very day it appeared Gustav Hamel looped on a standard unaltered Morane monoplane.

Hamel at first was very nervous, but I remember, that no sooner had he looped once than he looped again, and repeated the performance with a passenger. The late Miss Trehawke Davis was his first passenger in this manœuvre, and I was the second. That was in April, 1914. My turn came at the end of one of the Hendon flying meetings, and Hamel looped with me three times. I quote from the description I wrote at the time:

"There is a momentary feeling of suffocation just before the aeroplane reaches the top of the loop. The cause appears to be the sudden cessation of the rush of air due to the check to the machine's speed after its swift rush downward. Probably if in normal flight anything like the same check to a machine's speed occurred the same feeling of suffocation would be experienced. The feeling passes immediately, for directly the aeroplane has passed the top of the loop the speed increases again, and, moreover, it seemed a great relief to see mother earth again, notwithstanding the inverted position. Another thing that struck me—but this may have been entirely imaginary—was the acuteness of my vision looking at the ground below while the machine was upside-down. This was probably due to the novelty of the scene, and would pass off after a few seconds, though I would not care to remain in that position for many seconds. One more impression is, perhaps, worth recording, and that is the tremendous song of the wing stays and wings when plunging down vertically at the termination of each loop before the engine picks up again. It is a glorious mad rush down, provided a first-rate pilot is in charge. The dive must not be continued too long, and care must be exercised to bring the aeroplane to a level without violence.

"No distressing sensations were experienced, although Hamel felt a little ill on one occasion when he made a series of twenty-two loops, followed as they were by a long tail-dive. I am of opinion that it was the tail-dive that taxed him. At any rate, it was immediately after it that he complained of deafness and a general feeling of impairment. Surely falling back, with the machine's tail pointing earthwards, puts the pilot into a position unlike that experienced in any other sport; and it must be remembered the tail-dive is a swift reverse of the previous attitude of flight: the sudden change must be distressing. Merely to plunge suddenly into a cloud is sufficient to make an aviator feel slightly giddy. Decidedly the tail-dive—which very few machines are structurally sound enough to stand—is likely to tax a pilot's brain and body unduly, and it is to be hoped that very great care will be exercised by all who desire to emulate Hamel. By the way, the sudden jerk on the machine after tail-diving is distinctly alarming. Few machines could stand it."

Everybody who flew on types of aeroplane on which the loop was possible now emulated the pioneers, and it was not long before there was rivalry in the number of consecutive loops that could be performed. One man did more than a hundred.

In addition to the introduction of looping, M. Blériot and Pégoud were responsible for another feat, that of flying an aeroplane to a mooring which consisted of a hook arrangement suspended from a parallel. The aeroplane was flown under this and gradually climbed until the gear on the top wing, or above the cabane of a monoplane, hitched on to the suspension. In later years we have seen aircraft carriers and deck landings, and aeroplanes mooring to and flying from an airship.

Here is a list of the principal "stunts", taken from a R.A.F. Display Programme, which manifest the airman's art and the controllability of the machine. Nearly all of them had been done before the war; but the war may be said to have standardised them, and to-day the majority of Service pilots master them. The first manual on the subject was written by Mr. Horatio Barber, who (I think in 1916) invented the word "aerobatics", ten years afterwards claimed by a certain London newspaper!

1. THE LOOP.—Might be used by a pilot with an opponent right on his tail. By pulling the machine right up and over on to its back it might be possible to throw off an adversary. On the other hand, it is not a wise thing to do if opposed to an experienced pilot, because height is usually lost, and the opponent would still be above after the loop was completed.

2. HALF-ROLL ON TOP OF LOOP.—Is a more useful stunt, as it enables a pilot to gain height and to come out going in the opposite direction to that in which he would be going if the loop were completed.

3. THE HALF-ROLL.—A much more useful trick than the loop if an opponent is on your tail, as the machine is never out of control and the stunt can be performed quickly. Also useful to enable one to turn quickly and come down on the tail of an opponent. It is the quickest method of reversing the direction of a machine.

4. STALLING TURN.—Somewhat similar to the Half-Roll, but in this case the machine loses flying speed immediately before the turn. A kick on the rudder and a jerk with the control lever flicks the machine on to its back and it comes out of the resulting drive travelling in the opposite direction.

5. UPSIDE-DOWN FLYING.—This is purely spectacular flying.

6. STALL AND VERTICAL DIVE.—Chiefly used to enable a pilot to come down quickly from above to an opponent below. If an opponent is on one's tail, the worst possible thing to do would be to dive steeply, as one immediately becomes to all intents and purposes a fixed target.

7. SIDESLIP.—Useful if an opponent is on your tail, and invaluable for losing height without gaining speed when about to land.

8. THE ROLL.—Has no virtues as an aid to fighting, as it brings a pilot back into the same position from which he started.

9. Flat Turn.—This is a useful form of stunt for two-seater machines which have a back gun, as it enables the gunner in the rear cockpit to keep firing at an opponent. It is of little or no use to single-seater machines which have no back gun.

10. Vertical Spin.—A most dangerous stunt in aerial fighting for two-seater machines, as the machine is completely out of control and the opponent has only to follow down and wait for you to come out of the spin, when the machine becomes an easy target, even if not hit while in the spin.

11. Falling Leaf.—A purely spectacular stunt.

The art of flying surely includes aerial navigation; and that was primitive before the war. Compasses were so unreliable, and were so subject to error due to the conditions in which they were used, that most pilots preferred to be without them. The late Eric Clift, who did great work for flying and was a man universally liked, nevertheless studied the question, and produced compasses in which many of the difficulties were overcome. They were the forerunners of the wonderful instruments we have to-day. Air navigation was placed on a really scientific level during the War, and since the War it has developed to such an extent that the marine navigator acknowledges a debt to it. Astronomical observations have been taken with considerable success from aeroplanes and airships; but these will be entirely superseded by directional wireless, which will be used more and more also in marine navigation as the few minor difficulties which exist to-day are overcome.

CHAPTER XVI

THE CASUALTIES

The progress of flying has been marked by victory after victory over the causes of accidents, and only those who have been intimately associated with aviation from the early years fully understand this. From time to time a new critic arises lacking historical knowledge and the historical sense and, shocked by two or three accidents, he announces his "discovery" that flying is dangerous. Those who have taken part in the progress of aviation, on the other hand, are impressed by the vanquishing of one danger after another, and are confident that the remaining problems will be solved.

One thing the ignorant critic omits to take into consideration is the rapid development in performance, which has not been accompanied by a corresponding increase in the casualty rate. On any basis of computation, such as the number of fatalities in proportion to flights made, or distance flown, there is a steady diminution of sacrifice, and this despite the fact that in speed, in climb, in duration, and in load of goods, munitions, or passengers carried, the capabilities of aeroplanes have steadily improved. Even in military flying, in which military risks are taken and intensive training is carried on, the casualty rate is on the decline.

I have never agreed with those who proclaim that "flying is as safe as railway travelling", and it is somewhat irritating to be grouped with them by undiscriminating critics. Nevertheless it is time to say, with eyes open to the probability of accidents still to come, that it is reasonable to point to the statistics of well-run air lines and to claim that reasonable safety is almost attained. And by that I mean safety comparable to that of British railways.

We should always remember that the accidents in the period 1908–1912 occurred to aeroplanes which were very slow, and the fact that we get relatively fewer accidents to-day on machines of very much greater speed (in other words, proportionately to work done) speaks volumes. A bad landing on a fast machine is far more likely to prove fatal than a bad landing on the old types, even on the old "pushers", in which a crash involved the risk of the engine falling on the pilot's back. As a matter of fact, innumerable crashes occurred in those days without fatal results.

A scientific consideration of aeroplane accidents ought to regard potential, rather than actual, injury and death. Why should a bad crash out of which the pilot emerges scathless be ignored, and only the fatalities counted? Why should a trivial mishap which by chance kills a man be regarded as more vital to the statistics than a bad crash in which half a dozen people escape by a miracle? The croakers and the spiteful critics (for the latter exist) should count the crashes and the potential fatalities at all stages. If they did this with due regard to the steadily increasing performance they would come to no other conclusion than that flying is steadily improving in the matter of safety.

As before remarked, not only has ignorance and sensationalism exaggerated the danger of flying and warped judgment, but what looks remarkably like political ill-will towards aviation has been at work, as, for example, in *The Great Delusion* by "Neon". How some of them hate the air!

Now to the accidents which have most closely affected this country:

Lieutenant T. Selfridge had been killed in an accident in 1908, in which his pilot, Mr. Orville Wright, escaped, and E. Lefebvre was killed at Juvisy on August 7, 1909. Then a great shock was caused by the death, on September 22, of the great French scientific aviator, Captain F. Ferber, who for Service reasons flew as "M. de Rue". In a practice flight he was landing in a rough wind when the machine taxied into a ditch and turned over, and the engine fell on his back. I was at Boulogne two days after he was killed, just before the aviation meeting (spoiled by bad weather) at which he was to have flown.

The death of Ferber, however, created little consternation by comparison with the sensation caused by fatalities when they began to be common. The "sensation" increased with familiarity, for the very frequency of accidents was itself a sensation, and the newspapers made much of it. I do not object to that, and I join issue against those who would criticise newspapers for giving prominence to flying fatalities. Provided they give accurate news, and do not distort, they fulfil their legitimate function. It is right that loss of life in any circumstances should receive close attention; this is in the public interest. The cause of aviation has nothing to fear from it. Naturally one does object to such clichés as "Airman burned to death", when in the majority of cases in which this is displayed the airman was killed instantly by the crash, before the flames of the burning wreck touched his body; and even when this did not occur, in the majority of cases it should be borne in mind that the intense heat of burning petrol taken into the lungs destroys life with merciful quickness.

The death of the French pilot, Léon Delagrange, in an accident at Bordeaux due to the collapse of his monoplane, was deeply felt in England. Delagrange a few weeks before had endeared himself to the British public by his flying at Doncaster, and his was a most attractive personality. I remember I was crossing Piccadilly with Mr. T. O.'B. Hubbard on the 4th January, 1910, when the contents bill of an evening paper caught our attention—just the words: "Delagrange killed." We discussed it for a few minutes, and then we went to the post office and Mr. Hubbard, who at that time was secretary to the Aeronautical Society, sent a message of condolence to the Aero Club of France on behalf of the Society. That was not the first case of a machine breaking in the air, and that particular cause of disaster was soon to be all too common. Do the critics realise that if that and other causes of accident had not been overcome flying would long since have been prohibited by law in all countries?

It is interesting to recall the discussion provoked by Delagrange's accident. Thus, in the *Field*, it was surmised "that the planes, kept in almost rigid equilibrium by the gyroscopic power of the motor, would be strained to the uttermost by any sudden gust of wind. Not being able to yield, they would break. The machine was going at a terrific speed" (about 60 miles per hour!) "and although that of itself would not put a greater tax on the strength of the planes, since their angle of inclination was, of course, reduced, it does mean that a sudden gust of wind would strike them with great force. This is, in all probability, what happened, and although it has been correct to say that the motor was too powerful for the aeroplane, and that the aeroplane itself might have been somewhat the worse for wear, the precise and intensely interesting immediate cause of the mishap has not before been clear. It has, by the way, often been supposed that a single propeller would have a gyroscopic effect; but the monoplanists have never had any difficulty in steering, and it is therefore evident that the weight of the propeller is not sufficient.

"That Delagrange did not notice the gyroscopic effect of the revolving Gnome motor until his later flights is clear, because sufficient speed of revolution was not attained before. At first he proceeded very carefully with this experiment. There was an element of the unknown about it, and Delagrange realised that he ought to exercise caution. At Doncaster, although he flew on one occasion at 49.9 miles per hour, he was not getting anything like full power out of the motor.

"We have corroborative evidence provided by experiments on boats. Some years ago a gyroscope weighing some 2,500 lbs. was mounted in a torpedo boat, with the result that the boat kept a remarkably level keel, but the seas beat with so much power on the unyielding hull that the safety of the vessel was endangered; indeed, the idea had to be given up."

On April 2 of that year Hubert Le Blon, another of the Doncaster favourites, was killed in San Sebastian. It was said at first that his machine collapsed in the air; but this was doubted by many onlookers, and as a matter of fact an autopsy revealed that the aviator had in all probability fainted in his machine, and that this was probably due to the fact that just before he went up he had eaten a hearty meal. Little attention was paid to the medical aspects of flight in those days; accidents were becoming frequent, and the collapse of the machine in the air was often the cause.

On July 12, the Hon. C. S. Rolls was killed at the Bournemouth meeting, close to where I was sitting in the grand-stand. He was attempting the landing tests, and his machine came down from the back of us over the stands in a steep angle. At the moment of flattening out for the landing we heard a horrible crackling, and saw the tail of the machine break and twist around. The aeroplane, a Wright, turned over in the air and crashed. Poor Rolls, thrown out, had the misfortune to fall on his head, and his neck was broken. Otherwise there was not a bruise or a scratch on his body. (This accident will be referred to in the next chapter.)

Many of the accidents in those days were due to lack of experience in the rudiments of the art, and to this day at least one cause of accidents is the failure of the pilot to apply one of the lessons emphasised during tuition. In the early days there was no instrument to warn him of the approach of stalling point; he had to trust entirely to his personal sensations. But nowadays, when the Air Speed Indicator is a safe guide, and involuntary stalling should be unknown, the carelessness of pilots sometimes leads to trouble. More especially does this occur when the engine fails just after taking off and the machine is approaching the limit of the aerodrome, or has just passed beyond it. Instinctively in that case the pilot thinks of turning back to the good landing ground; he shrinks from making a rough landing in difficult ground beyond with, in any case, the trouble of getting the machine away again. It is perhaps not remarkable that to this day this is one of the most prolific causes of bad accidents, and I have often said that pupils ought to be given such a drilling and frightening that instead of instinctively trying to turn back they would instinctively avoid turning back in all such circumstances, without exception. Although the universal use of the anti-stall gear or of slotted aileron control, or of both, would do much to reduce the danger, I still think that if both were made compulsory the pilot's education ought nevertheless to be improved in the way suggested.

But in the early days machines, generally speaking, were structurally unsound, and in that respect we have made great advance. It is true machines occasionally collapse in the air to this day, but the cause is almost invariably "wing-flutter," which does not occur at the more moderate speeds and, in fact, only concerns fast military types and racers. Far too many fatal accidents have, however, occurred from this cause, and one or two of them have been inexcusable and reflect not a little upon departments which have to do with the approval of machines for flight, and their subsequent inspection.

But to go back to the early years, I had many occasions to draw attention to the sense of security in flying so far as the pilot's sensations are concerned, a sense of security out of all proportion to the grave results of carelessness. It is this disparity that must never be overlooked by the aviator. It need not make him timid, but it should make him extremely cautious; and it is the cautious aviator who is successful, and who helps the progress of aeronautical science. This truth has been proclaimed again and again by the great flyers and experimenters. The science has no use for the reckless, unstudious, and applause-loving aviator.

A propos of one accident I wrote, "One can imagine poor——, with over-confidence bred by the apparent safety of the sport and by the complete absence of any sense of great speed or even of altitude, attempting to rival the swallows. Probably he never realised the picturesqueness of the spectacle he was providing for the onlookers. He had never thought out the wholly uncertain factors of speed and air pressures, and he naturally trusted his machine to sustain any movement that by the manipulation of the levers he could demand of it. There was nothing to tell him through his personal sensations—either by the strength of the rushing wind on his face, or by the tilt of the machine sideways or longitudinally—that he was doing desperate things. Down below lay the country and the aerodrome, with its line of spectators and sheds and stands. Seen from his height they scarcely seemed to move. Even when his machine turned over, and he began to fall, it is more than likely that the descent seemed scarcely faster than an ordinary descent—and, indeed, it may not have been. To the last he may have expected to get through all right."

Collision in the air is to-day the greatest dread of the airman. At race meetings or at flight schools the sky becomes unpleasantly crowded, and although there are clear rules of the "road" the speed of aircraft is so great that at times collision is only averted by the exercise of swift judgment and skill. A contributory cause is the restricted view afforded to the pilot by some designs of aeroplane, this making it difficult to see all around him. In the case of the air lines the risk is less, provided the rules of the aerodrome are followed and signals obeyed, that is to say in clear weather; the presence of slight fog increases the danger, whilst dense fog is perilous. The almost incredible collision of two machines far from crowded aerodromes near the British coast a few years after the war showed that on regular air lines machines flying at the same level, as very often occurs, similar conditions inducing pilots to fly very much alike, collision is possible, and thereafter rules as to routes to be followed out and home were drawn up.

Pilots have a dread of flying in cloud, and they usually keep below it in order to find their way easily by landmarks. This, however, is doing less than the best, for it is perfectly easy to make an accurate course nowadays by means of directional wireless. Nevertheless, pilots instinctively shrink from flying up or down through clouds, fearing they may encounter another machine on the way. Here it should be a simple matter to contrive rules making even this operation perfectly safe. But at the moment of writing it looks as if there is reason to hope for an adaptation of television which will give pilots sight of aircraft in the vicinity; and, by the same token, the same discovery should make it possible to make landings on fog-bound aerodromes even without the Leader cable, which is a costly equipment.

I believe the first air collision occurred on September 8, 1910, when the Russian, Wachalowski, flying with the Archduke Leopold Salvator, collided with an aeroplane flown by his brother at Weinen Neustadt. If my records are to be trusted none were killed, but one of the pilots had both legs broken. In the same year on October 2, as already related, Captain Dickson and M. Thomas collided at the meeting at Milan, and both were badly injured.

Many accidents are due to flying meetings being held in small aerodromes. The Milan meeting in 1910 was a case in point. Those who knew feared it was unlikely the meeting would proceed without some serious accident, and as the days passed were only more convinced that nothing but the skill of the aviators prevented disaster. The collision in mid-air that eventually took place between Capt. Dickson, who had repeatedly expressed his strong disapproval of the dangerous conditions, and M. Thomas, was the second accident of this kind that aviation had seen. It is quite possible that it was caused by the pilot of the Antoinette failing to see the other machine, the flyer in this type of aeroplane having a rather restricted view.

Up to the end of 1909 there were accomplished no more than 64 flights of over one hour's duration. In 1910 there were 397, the fatal accidents numbering 29. In 1911— between January 1 and July 31—there were no fewer than 667 flights of over one hour's duration, and in the same period there were 35 fatalities. Of the 667 flights 50 were of over three hours' duration, and the majority were across country.

On the assumption that each fatality in 1910 represented flights of 3,500 miles, it appeared that in 1911, on an average, each death represented 4,900 miles of flight. As a matter of fact, the assumption was unfair to the actual improvement that had taken place in practice of flying, because although it showed a diminishing mortality, it took no account of the improvement in the quality of the flying, or of the fact that airmen were flying in winds that a year before would have kept them in their sheds.

Mons. Boutticaux, analysing the accidents of 1910, reported that the contributory causes were as follows, in the order here given: (1) Faulty construction; (2) mistakes of the pilot; (3) atmospheric disturbances; (4) accidents due to spectators, etc. The diminution of accidents from the first-named cause partly accounted for the general reduction of accidents. Meanwhile, other causes were at work to diminish the number of accidents.

At the end of May, 1911, I wrote in the *Observer:*

"Since the beginning of the year there have been thirteen aeroplane fatalities. Without consideration of the amount of flying that is in progress the figure looks alarming, and I would not suggest for a moment that a light view should be taken of it; on the contary, it is to be feared that aviators and makers of aeroplanes are somewhat neglectful of the lesson of the fatalities. It would be good work to concentrate attention upon them; we know that most of them could have been avoided, and that in the unavoidable ones the effects of the accidents could have been mitigated had the machines been properly designed. Many manufacturers and aviators, however, do not consider this at all, but go on their way with methods and machines unmodified.

"There is one other point which becomes of greater importance as time passes. It is that unless the art of flying were rapidly improving and unless the machines were becoming more efficient, the number of fatalities would be at least twice as many. For whereas in the early days of last year only men of exceptional nerve and skill learned to fly, and they proceeded to work with the utmost caution, being very fearful of wind and not caring to make daring experiments, nowadays quite ordinary persons take up flying, and even in the pupil stage perform feats that would have astounded the men who were famous a year ago. Also, flying takes place as a matter of course nowadays in windy weather; machines, therefore, are put to greater strain. And yet the rate of mortality is declining."

Two pilots went up when suffering from physical disabilities. The accident in which E. V. B. Fisher and his passenger were killed at Brooklands in May, 1911, seems to have been a case in point. Fisher had not completely recovered the use of his left arm. He had dislocated a shoulder in a cycling accident, and this may easily have precipitated his accident. In ordinary circumstances the control wheel would be easily turned with one hand, but on occasions requiring sudden turns, or when the machine encountered a "hole" and the pilot was almost jerked out of his seat, there was need to hold the wheel firmly. Clearly a one-armed man would be handicapped, for if the wheel were slippery from oil—as it often was—and it were jerked out of his hand, he might find it difficult to recover instantly.

While practising on a Valkyrie monoplane at Hendon on the evening of May 25, Walter Benson, a pupil, fell from a height of about 200 feet, and was killed. The aviator had not shut off his engine in his descent, and the explanation was to be found in the scientific data obtained from the post-mortem examination. It was noticed by Drs. Hopkins, Sinclair, Webb, and Nitch-Smith that the airman's heart was abnormally small, weighing only 9½ oz., instead of between 10-oz. and 12-oz. the weight of a normal medium-sized adult. This pointed to cardiac failure induced by the altered blood pressure consequent upon the unaccustomed height to which Mr. Benson had been flying.

Curiously enough, I believe that another fatality in a Valkyrie was found to be due to the pilot's bad state of health.

Harold Barnwell, the brother of Mr. F. S. Barnwell, the designer, is believed to have fainted in his machine, for he dived without apparent reason straight to the ground. He managed the Vickers' School of flying for a time and was a test pilot of great skill.

I wrote in the *Field*, October, 1911: "Have aviators less than the normal man's caution? Judging from their neglect of obvious lessons of accidents this would seem to be the case. Take that one prolific cause of fatalities, the bursting of the petrol tank and the burning of machine and pilot. One accident from this cause ought to have been sufficient; for any repetition of it could have been easily avoided. Yet this year already twelve deaths have been due to the burning of the machine. Petrol tanks made of extremely thin brass are still being made, and they are being fitted in a manner and in a position where they are most likely to be a source of danger. The petrol feed-pipes are usually of the most delicate description. The remedy is obviously to use petrol tanks of steel mounted in a secure place, proof against the effect of vibration, and provided with feed-pipes of armoured flexible tubing. This simple provision would, at any rate, prevent some accidents. A strong leather jacket for the tank has been suggested, and it might answer the purpose.

"And yet the petrol tank used to-day is the same as that employed on the earliest machines, when it was really necessary to consider questions of ounces. Attempts have been made in a half-hearted way to reduce the danger by fitting the tank with compartments in order to prevent the rolling of the petrol from side to side; and even this very sensible step has not been encouraged—rather has it been regarded as finicking. It is, of course, inadequate; and the only remedy seems to be the employment of steel and the careful consideration of the most suitable position and mounting. Manufacturers are very much to blame, and aviators themselves are equally culpable, for they cannot be excused for neglecting so important a detail. The whole thing is a mystery, and causes one to raise the question as to whether aviators are deficient in ordinary caution. A recent analysis of accidents due to this cause shows that in nearly all cases the machines were of the propeller and engine in front type, either monoplane or biplane, and it is sought to show that this is a danger due partly to this form of construction. I do not think this argument is tenable; but even if it be, the use of a properly-made and fixed tank and pipes will get over the difficulty. But, as a matter of fact, a machine is just as likely to be burned in a fall if it have the engine behind; and I have seen two accidents in which the pilot, although luckily unburnt, was simply saturated with the escaped petrol, which by the merest luck had not become ignited, although, in one case, the engine was still running."

The death of Graham Gilmour was due to a prolific cause of accidents between 1910 and 1913, namely, the structural weakness of monoplanes; and for a long time the secret baffled the experts. Many of the earlier of these fatalities occurred to monoplanes fitted with rotary engines and flying at speeds hitherto unattained; and, as already remarked, it was believed that the gyroscopic effect of the engine imposed certain stresses on the wings and controls. Upon calculation, however, it was found that the gyroscopic effect could not be very great, and it was therefore assumed that the increased speed of flight was the main cause. No doubt it was a contributory cause, but the truth did not appear until many lives had been sacrificed. Several officers of the Royal Fying Corps lost their lives, and in France fatalities were startlingly frequent. In both countries a ban was put on monoplane flying in the Service.

D. Graham Gilmour was killed in February, 1912. He was flying a Martin-Handasyde near Wimbledon Common when the right wing of his machine appeared suddenly to buckle upwards, quickly followed by the other, the entire mass immediately plunging to earth from a height of about 300 feet. Apparently Gilmour endeavoured to jump clear, but was dead when assistance reached him. He was a skilful, experienced, and daring aviator (his work is mentioned elsewhere in this book).

The list of British flying fatalities up to that time was as follows:

Aviator.	Date of Death.	Place.
Hon. C. S. Rolls ..	July 12, 1910	Bournemouth
Cecil Grace ..	Dec. 23, 1910	The Channel
B. G. Benson ..	May 25, 1911	Hendon
V. Smith ..	May 27, 1911	St. Petersburg
G. F. G. Napier ..	Aug. 1, 1911	Brooklands
T. J. Ridge ..	Aug. 18, 1911	Aldershot
Lieut. R. A. Cammell ..	Sept. 17, 1911	Hendon
Hubert Oxley (with passenger)	Dec. 23, 1911	Filey
D. Graham Gilmour ..	Feb. 17, 1912	Richmond

In those days reports by the Accidents Investigation Committee of the Royal Aero Club were akin to Board of Trade reports on railway accidents. In the case of accidents on Army machines the War Office held an independent inquiry, but this took into account matters beyond the province of the Club's inquiries, which were concerned only with the causes of the accidents, whether due to the machines' imperfections or to the lack of skill of the pilots or any other circumstances.

Aeronautics was (and is) an infant science, and the mutual co-operation of all who have special qualifications was (and is) required. The military authorities and the Club were working in complete sympathy in this, as in other matters. The composition of the Accidents Committee included the Director of the Royal Aircraft Factory, Mr. (now Lieut.-Col.) Mervyn O'Gorman, Major-General Ruck, Commander (now Air-Commodore) C. R. Samson, Colonel (now Brig.-Gen. Sir) Capel Holden, and the late Colonel J. D. B. Fulton. A special War Office committee was appointed to investigate those accidents to monoplanes in which the structure failed in the air. Meanwhile, the flying of monoplanes during the Army manœuvres was prohibited and laboratory experiments were carried out.

The commonest cause of monoplane wing breakage was sudden transference of the load from the bottom to the top of the wing. The wings were stressed under the misapprehension that the load was always an "up" load, and there was general neglect to provide against "down" load. The process of breaking was always the same; first, the wings began folding down and back, but the moment the fracture occurred they folded up like a butterfly. I have seen this occur on three occasions, the last one being that in which M. Maneyrol was killed at Lympne in a light aeroplane competition.

It was no doubt partly due to this discovery that the biplane became the principal class of machine in use, for it was realised that the advantages of the monoplane were offset by the impossibility of securing sufficient structural strength without a hampering increase of weight. The biplane has a smaller span, and the wings are stoutly braced together, affording mutual support.

About this time Mr. W. O. Manning directed attention, in an article in *Aeronautics*, to one of the causes of the high mortality which, although diminishing relatively to the amount of flying, was still so heavy that it constituted a serious drag on the progress of flying. He attributed the deadly effect of many accidents to the high speed at which many of the machines landed, and pointed out that in the early days, when the Blériot monoplane—25 h.p. Anzani was the "stunt" machine, accidents were frequent, but seldom or never fatal. While the number of bad smashes diminished, the proportion of deaths to smashes on certain types of machines became very large.

"The remedy undoubtedly lies in developing a type of machine which will land slowly, and in which the range of speed extends down to a speed of at most 40-43 miles per hour, whatever the top speed may be. This requirement certainly seems at first to favour the large surface biplane, but it must not be forgotten that an English monoplane has recently shown a speed variation of from 68 to 41 miles per hour."

Mr. Manning pointed out that speed need not be sacrificed, for in "some of the recently investigated cambers a high L/D ratio is found over a large range of incidence angles, and it is not difficult with a powerful motor to arrange for a speed variation of 100 per cent. Thus, a machine with a speed range of 40-80 miles per hour would be possible."

It is interesting to recall the speed terms discussed in those days and to find an expert in 1912 referring to three or four years earlier as the "early days".

Fourteen holders of British certificates issued by the Royal Aero Club were killed in 1912, viz:

Feb. 17	D. Graham Gilmour	Richmond
April 19	D. L. Allen	Irish Sea
May 13	E. V. B. Fisher	Brooklands
July 5	Capt. E. B. Loraine and Staff-Sergt. R. H. V. Wilson	Salisbury Plain
Aug. 3	C. Lindsay Campbell	Brooklands
Aug. 13	R. C. Fenwick	Salisbury Plain
Sept. 6	Capt. Patrick Hamilton and Lieut. A. Wyness-Stuart	Hitchin
Sept. 10	Lieut. E. Hotchkiss and Lieut. C. A. Bettington	Wolvercote
Sept. 21	H. J. D. Astley	Belfast
Dec. 15	Lieut. W. Parke, R.N.	Wembly
Dec. 24	E. Petre	Marske-on-Sea

During four years, commencing with one death in 1908, and increasing in 1911 to seventy-four, and over 100 in 1912, the total number of deaths from aviation accidents throughout the world had then reached about 200.

It seems only yesterday that the warping, or flexing, of the rear extremities of aeroplane wings was regarded as the most excellent method of regulating lateral stability. It was Nature's method, exemplified in the birds; and it was the method adopted by the Wright Brothers. Most other constructors of the early days—even the makers of monoplanes—adopted the aileron, or the flap, not usually because of any acknowledged superiority of this contrivance, but to obtain the same result without copying the Wright Brothers. It is true, the Wright patent concerned not merely wing-warping, but a system of control coupling wing-warping with rudder movements; but that is a matter into which there is no need here to enter. What the writer desires to call attention to is the decline of wing-warping at the period referred to in favour of ailerons, or flaps, hinged to the right and left rear extremities of the planes. Time has its revenges, and one of the most interesting developments in aeroplane design was the recognition of the faults of flexing wings. As every pilot and constructor knew, the constant operation of flexing the tips of the wings sooner or later had seriously detrimental effects; the wings get "tired", and the control by this method weak; worse still, permanent distortion, more or less serious, appeared, affecting the machine's behaviour in flight by no means healthily. The tips, for example, took on a slight permanent twist. This defect had, of course, long since been recognised, and constructors almost without exception, sought to overcome it, usually by loosely mounting the ribs round the spars so that there was a certain amount of "play", and not much actual bending of material. The fact remained, wing-warping was not the ideal method, and on all hands one heard the demand for something less delicate and more easily repairable.

The day soon came when the Government insisted on flap aileron controls in all machines for serious use.

On Friday, June 13, Gordon Bell, accompanied by Lieut. J. R. B. Kennedy, of the Royal Flying Corps, was demonstrating at Brooklands on a Martin-Handasyde monoplane when the machine lost way, and turned nose downwards from a low height and crashed into the ground. Lieut Kennedy was killed instantly, and Bell seriously injured.

Lieutenant Wilfred Parke, R. N., and Arkell Hardwick were killed at Wembley on December 11, 1912, by the fall of a Handley-Page monoplane in which they were flying from Hendon to Oxford. This was one of the too frequent cases of a pilot attempting to turn back to the aerodrome when his engine failed soon after the take-off.

Lieutenant Parke belonged to that type of flier who "fly with the head". It is true that he also flew for the very joy of flying. "You feel like a king, it is so glorious," he exclaimed to me once—but he never made a flight without studying and experimenting. Indeed, I had asked him only a day or two before if he did not think he took it a little too arduously.

As to the machine he was flying, there was no fault to find with it, save that the pilot's view was somewhat limited, so that it was at times difficult for him to see and alight upon precisely the spot he selected. The design of the wings enabled the machine to keep its balance, even in gusty weather, without control by the pilot. In flight in gusty weather the machine had a roll, but recovered balance. In turning, it "banked" itself naturally; and one of Lieutenant Parke's subjects for experiment was to ascertain the effect of rudder and wing-tip control in combination with this natural "banking."

Lieutenant Parke was always studying such problems even when in peril. During the Military Trials, 1912, his machine —an Avro—took a tremendous spiral dive, and his efforts to overcome it by the approved methods were futile. He tried all possible combinations, and finally the machine was brought up level within sixty feet of the ground. It was one of the most remarkable escapes on record.

Without a moment's loss of time, he related minutely everything he had done while it was fresh in his mind, so that the problems involved could be discussed. (The test pilot of to-day regards this sort of thing as his job, and deliberately courts dangers such as "wing flutter", in order to observe results.)

Parke took his pilot's certificate on the Bristol biplane in April, 1911, and was No. 73 on the list, and joined the Naval Wing of the Royal Flying Corps. Before joining, and while a member of it, he took every opportunity of flying different types of machines; and there were few more experienced or versatile pilots. He was not a "fair weather pilot", but used to say that it was much more interesting to fly in winter than in summer, and in wind than in calm.

Deplorable also was the loss of Mr. Hardwick, who, although little known outside aeronautical circles, was one of the chief supporters of aviation in this country.

Lieutenant Parke and Mr. Hardwick were the twenty-third and twenty-fourth British airmen to be killed, and no fewer than sixteen of them (including one killed in America) had met their deaths in 1912. This was the fifth double air disaster in 1912 in England.

What a different history of aviation might be written if the fetish of speed had not been raised. War demanded speed; the great prizes were in nearly every case offered for the achievement of speed; it was erroneously supposed that speed meant safety and stability, and that stability demanded speed. For making headway against wind the power for speed is, of course, necessary.

But supposing, instead of speed, the vital importance of slow-landing had been placed foremost of all considerations, supposing that a maximum landing speed had been ordered, say, a landing speed of 30 miles per hour, and that all other progress and development had been subordinated to that first requirement. Then, I think, all that we have won would have been ours, and that with little sacrifice. It may well be that greater progress in the performance of which we are so proud would have been made had that one great requirement been rigorously imposed.

By this time flying would have become really commercial, and air lines throughout the kingdom and all over the world would have been established; doubtless, by this time self-supporting, or nearly so. After the war the air line expert set up the standard of 100 miles per hour. He bitterly regrets it to-day. It is not necessary to a travel method which goes straight from point to point, and is independent of rail and road limitations and of the enormous freight without which a packet boat or railway service cannot pay. An air service pilot needs that 100 m.p.h. for occasional headway against head winds, but as an average travel speed he need only attain 60 m.p.h. to beat all other methods by fifty per cent., excepting, of course, the three or four fast railway runs between great centres.

Paris by air in four hours would be good enough, provided the service ran every two hours by day and night. The present boat and train services could not compete against that; and the machines which could accomplish it would be capable of landing slowly. They could, in addition, even be fitted with anti-stall gear and with control below stalling point contrivances. They would be more nearly on an economical fuel and other basis. They would never be many minutes behind schedule time; no more often than are trains and boats.

If that fetish of high speed had never been set up, with its grotesque illusions about stability, and its dependence upon the pilot's exceptional skill in emergencies, the long toll of accidents would not have frightened capital away and alienated so much of the sympathy of the public.

Is it too late now to learn the lesson? Are there not leaders in the aeronautical movement big enough to call a halt and set up a better standard? Had that been done we should by this time have our high-speed machines, which also would be safe. Insist upon a sane landing speed, and all other things will be added unto us. (Since writing this the terms of the Guggenheim prize competition have been announced, and they stipulate for a low landing speed).

CHAPTER XVII

MORE BRITISH FLYING MEETINGS

THE Bournemouth Meeting (July 6–16) was the first important flying meeting in England in 1910. Meetings had taken place earlier in that year at Huntingdon and Wolverhampton, but both these had been disappointing. Wolverhampton, especially, was a failure, and most of the flying was done on the last day when the wind was so gusty that the committee was criticised for permitting ascents. Five machines were broken, four of them badly smashed. In the totalisation contest luck of the weather was a big factor; I find a note that the Hon. Alan Boyle won a duration prize with a flight of 3 minutes 50 seconds!

At Huntingdon Mr. J. Radley did the fastest mile, 1 minute 47½ seconds, a British speed record! There, too, Mr. Tom Garne was an active figure.

Bournemouth was an international meeting, and followed immediately on the second Rheims meeting held the previous week, from July 3–10. For this reason none of our flyers were at Rheims; but J. Christiaens, Morane, and Wagner, who had been flying there, came to Bournemouth. The triumph of the monoplane over the early supremacy of the biplane was perhaps the most important feature at both these meetings, and came as a great surprise.

At Rheims, Antoinette and Blériot monoplanes took all the first prizes and most of the minor ones, too. This return of the monoplane to its former place of honour, lost soon after the first flight across the Channel, was due to two causes, the increased efficiency of the Blériot monoplane, now strengthened for the 50 h.p. Gnome motor, which had before been the cause of its fall from grace, and secondly, the increased reliability of the Antoinette motor. But for the disaster to Wachter the triumph of the Antoinette would have been complete. The duration capacity of the Blériot was another feature of this meeting. This machine made a non-stop flight of over five hours.

The total prize money at Rheims amounted to over £9,000, and included a race for women aviators, prizes worth 2,000 and 3,000 francs being given to the two ladies who made two rounds of the ten kilometre course in the best time, the maximum time allowed for doing this being twenty-five minutes.

Of seventy-five entrants, fifty-five actually took part in the Rheims meeting.

There were only nineteen entrants at Bournemouth, and of these two, at least, did not fly. Nevertheless, Bournemouth was a great meeting, one of the most important items being the race across the sea to the Isle of Wight and back, when Mr. (now Lieut.-Col.) Robert Loraine caused much anxiety to his friends by flying to the island in a severe rain storm. The prize was for the quickest flight from the aerodrome across the Solent, round the Needles, and back again. The distance is about 22 miles, of which 18½ are over sea. The competition did not take place until the fifth day of the meeting, and the entrants were Morane, Drexel, Grahame-White, Cecil Grace, Capt. Dickson, Wagner, and Christiaens.

At four o'clock in the afternoon, Morane, wearing a lifebelt, started away on his new Blériot, which had only arrived that morning. He ascended to a height of 700 or 800 feet, and headed towards the sea in an easterly wind of about fifteen miles an hour. We could see that he was making too much to the west, but the atmosphere was not clear, and after eight minutes the machine was lost to view. Ten minutes after Morane Drexel started, also in a Blériot-Gnome, ascending to a greater altitude than Morane.

Waiting for their return seemed long and tedious, and some anxiety was felt on account of the gusty wind; but twenty minutes after the start Morane's aeroplane was sighted in the south-eastern sky. He was flying at a great height, but came down lower as he approached the course. He finished his flight with a graceful vol plané, a chorus of motor horns and loud cheers greeting him; and he was seized by his friends and carried shoulder high to the sheds. He said that the wind carried him far to the west and he could not see the island throughout the journey owing to bad visibility. He could not make certain of the position of the Needles, so to be sure that he had rounded them he almost circled the island! His time was 25 minutes 12 2-5 seconds.

Drexel was 10 minutes longer in the air, and again uneasiness was felt, for the two machines were theoretically of the same speed. Drexel said he had flown over the Needles at a height of 1,000 feet and had experienced the same difficulties as

Morane. The extra ten minutes he had taken he accounted for by the fact that his engine was getting old, and also that at times it missed fire. Neither airman had seen the other.

A little later Wagner, in his Hanriot, attempted a start, but something went wrong with his engine, and he had to abandon the attempt for the day.

The next day opened with a fitful wind and overcast sky which soon turned to rain. At 3 o'clock in the afternoon, the rain having stopped, Mr. Loraine prepared for an attempt. There was no chance that his Farman would beat Morane's time of the previous day, and Mr. Loraine's attempt was regarded as an effort to uphold the honour of Britain, and he was loudly cheered as he started. The wind carried him out over the people's heads on the western side, but he won back and headed towards the Solent. In eight minutes he was out of sight in the mist, and almost immediately afterwards the aerodrome became enveloped in deep gloom, and a terrific rainstorm burst. Mr. Loraine was a good flyer, but had not had much experience, and his danger was acutely realised. The rain was so dense that visibility was impossible for more than a quarter of a mile, and it was likely to be a long time before the attendant motor-boats could find him if he came down in the sea.

There was no news of him for an hour and a quarter, and Lord Montagu of Beaulieu had long before this hurried off in his yacht in search of him. At 4.30, however, a telegram from the Needles Lighthouse stated that at 3.40 a biplane had been seen on the Mainland Cliff, and a few minutes later we heard by telephone that an aeroplane had landed on the downs at Alum Bay. Mr. Loraine was drenched to the skin when he landed. He said he completely lost his way, but after a fierce struggle with the wind and rain he had sighted the high land above the Needles and found a good landing place on the golf links.

The storm did not last long, and Morane and the Hon. Alan Boyle made flights. The latter met with a serious accident just after he passed the second pylon. The motor of his Avis monoplane gave trouble, and caused him to come down in a clover field, where the front landing wheels stuck in the soft earth and the aeroplane turned completely over. Mr. Boyle was thrown forward on his head, but he was wearing an inflated rubber casquette which just saved his life. Another rain storm came on, and from the grand stand the broken aeroplane and the group of officials and doctors who had hurried to the spot could scarcely be seen. Mr. Boyle was suffering from severe concussion.

After this second storm, which lasted only a few minutes, the weather improved, and at 6 o'clock Mr. Grahame-White started on the oversea flight in perfectly calm and clear weather. He took a more easterly course than the others, passed directly over Hengistbury Head, crossed the Solent, rounded the Needles, and returned in 45 minutes 48 seconds, and won the third prize (£100), Morane having won the first (£800), and Drexel the second (£400).

Lt.-Col. R. Loraine, by the way, is the brilliant actor, who, however, has always had wider interests than those of the stage. He began his theatre career at a very early age, but when the South African War broke out volunteered for service and went out with the Machine Gun Corps, obtaining the Queen's medal with three clasps.

In January, 1910, he turned his attention to flying, the aeroplane he started to learn on being a Blériot Cross-Channel type. He wanted, however, a machine with a longer range, so he bought a Farman. He was granted his certificate on June 21st, by the Aero Club of France, his number being 126; and it is worth noting that up to that date only thirteen certificates had been granted by the Royal Aero Club. He brought this machine to England, and, incidentally, Jules Védrines (afterwards to become so renowned) to look after his engine, and later on Emile Védrines to act as rigger. He crashed the machine at Beaulieu whilst making a landing in gusty weather, just before the Aviation Week at Bournemouth, and barely managed to repair it in time. He took part in the Blackpool Aviation Meeting, and from there flew to Llandudno, then on to Anglesey, and then to Ireland. These cross-country flights were really remarkable achievements when most aviators confined themselves to competition and exhibition flying.

Mr. Loraine was using his aeroplane to make an aerial tour of the country; but in his case flying was a hobby. He tried at first to hide his identity under the name of "Jones". His flight across the Irish Sea was a very adventurous one. On the way his machine began to break, but he succeeded in reaching the coast of Ireland at Howth Head. The ground there was unfit for landing, so he tried to fly round the Head to the north side of it, but was losing height all the time, and eventually, as the machine was absolutely breaking to pieces, had to come down on the sea close to the beach.

At the outbreak of war, when, of course, he immediately offered his services, he was soon sent out to the front. On November, 22, 1914, he was wounded by shrapnel when making a reconnaissance. In the autumn of 1915, he received the M.C.

after bringing down a German plane. In 1917 he received the D.S.O. After the end of the war Robert Loraine (we call him by the name by which he is known to the public—titles seem out of place in his case) returned to his work on the stage, but is still deeply interested in flying and is frequently at the Royal Aero Club.

To those who were present the first thought when recalling the Bournemouth meeting is the fatal accident to the Hon. C. S. Rolls on the third day, while competing for the alighting prize on the Wright biplane on which he had made his brilliant double crossing of the Channel a few weeks before. He had had a movable tail-plane fixed in place of the fixed tail-plane, and this change was undoubtedly the cause of his death.

The accident happened just in front of the grand stand. Rolls had ascended higher than was expected, probably to allow himself a longer glide down so that he could steer more easily for the landing spot. He made two circles to gain height, then flew over the motor enclosure at high speed with a strong following wind, round the back of the grand stand into the teeth of the wind, and glided on a steep gradient towards the mark. At a height of seventy feet he stopped his motor and began to glide down at an angle of about 40 degrees, relying on the wind to help him to avoid a long run on the ground; but to check the descent he brought the elevating planes up very sharply. The machine was at a height of 50 feet when the left side of the tail-plane broke away with part of the left of the rudder. There was a sound of splitting wood, and the elevating plane swung back. The head of the machine turned sharply towards the earth then back, and so crashed, upside down from a height of about 30 feet. The crash, witnessed by thousands of silent and horrified spectators, was followed instantly by a loud report in the engine. Rolls was found lying clear of the machine, and apparently unscathed. He was, however, lifeless, and the doctor said that death had been virtually instantaneous from concussion.

When Rolls came down from an attempt to win the landing prize on the Monday, when he had got within 78 feet 10 inches of the mark, he said that he had found his machine would not readily answer the rudder. He thought something was wrong and had descended, but everything seemed to be in order. On the day before the fatal accident, however, when the new tail was being attached to his aeroplane, the mechanics, working from French drawings, found some difficulty in ascertaining the correct position, and there had been some discussion. The accident was probably due to overstraining when flattening out, and not to any wrong adjustment of the tail and fittings.

The Hon C. S. Rolls was the third son of Lord and Lady Llangattock, and was in his thirty-fourth year when he met with the accident that cost him his life. He had a passion for mechanics as a small boy, and acknowledged that anything that could be made to go fast possessed a boundless fascination for him. He went to Eton and Trinity College, Cambridge, and took his M.A. Degree in mechanical engineering in 1902. His first practical acquaintance with motor cars was made in France, before the Act of 1896 had been passed in this country legalising motor cars on the public roads.

Rolls was one of the first founder members of the Automobile Club, and was a member of the committee of the club for eleven years. He competed successfully in numerous motor racing competitions in England and the Continent, and was awarded the Gold Medal Trial of 1900. He and the late Claude Johnson became associated with Royce. Ltd., and the firm Rolls-Royce was established.

He was a joint founder, with Mr. Frank Hedges Butler, Miss Vera Butler (Mrs. Iltid Nicholl) and the late Mr. Stanley Spencer, of the Royal Aero Club, (recorded on page 337) during a balloon ascent. He was a keen aeronaut, and made more than a hundred and sixty balloon ascents. His double flight by aeroplane across the Channel is described in Chapter 12. Rolls, by the way, was elected a member of the Jamestown Aeronautical Congress in 1907.

The first prize of £250 for the alighting competition at the Bournemouth meeting was won by Mr. Grahame-White, who got within 7 feet of the bull's eye. Christiaens won the second prize £50, getting within 29 feet 3 inches.

The first prize in the Starting Competition was won by Capt. Dickson, who rose after a run of 35 yards 7 inches, and the second prize by Morane, who ran one inch further before "unsticking". The prize of £500 for general merit was also won by Morane. Captain Dickson won the first prize for weight-carrying, £350; the first prize in the Speed Contest (five laps, of 8 miles 1,620 yards), and the first prize in the altitude contest. Mr. Grahame White secured the first prize for the longest flight, 90 miles 1,740 yards, in 2 hours 34 minutes 56 1–5 seconds—£300.

One of the livelier features of the Bournemouth meeting was the flying by M. Audemars on the Santos Dumont "Demoiselle", which made the most amusing hops, and earned the nickname "grass-hopper". Frequently it overturned in landing, but the pilot, being seated in a sort of cage below the wings, always came out smiling.

The number of pilots who flew the Santos Dumont or "flying grasshopper" did not exceed three; M. Audemars was one of them, Maurice Clément and L. Versepuy were the only others, if my memory serves.

Mr. Lancelot Gibbs, one of the Bournemouth flyers, was said to be the seventh man in the world to fly. As if the inherent difficulties of flying were not at that time serious enough, Mr. Gibbs was on one occasion the victim of an infuriated crowd. He was engaged to make flights at Durango, in Spain; but owing to some mistake of the organisers, and a little reluctance on the part of Mr. Gibbs' magneto, the crowd got out of hand, rushed the aerodrome and broke and burned the machine. During the riot the cry "Down with science! Long live religion!" was heard. He flew at the Wolverhampton meeting, and had an accident there, fortunately without sustaining serious injury.

One of the most striking personalities at the Bournemouth meeting was that of Mr. Alfred Rawlinson, who is referred to in a chapter dealing with an even earlier phase of aviation. "Toby" Rawlinson was a fine polo player, and in the course of that and other rough games had learned to regard accidents and personal injuries as mere incidents. For some years he served in the 17th Lancers. He went in for motoring as early as 1901, and drove a Darracq in the Isle of Man "Four inch" race with a bent axle which prevented him making a right-hand turn except by side-slipping! Nevertheless, he finished seventh out of a field of 35. At the end of 1909 he joined the Farman flying school at Mourmelon and, to the amazement of the experts, insisted on fitting a 130 h.p. Darracq in his machine. He flew with this, but exchanged the engine for a lower power one, a Darracq with horizontally opposed cylinders giving about 65 h.p. He and the late C. S. Rolls were the only British representatives at the Nice Meeting in April 1910. At Bournemouth Rawlinson came to grief when taxying over a bad patch in the aerodrome, and dislocated a shoulder. I recall the fact that he expressed his indignation with some vigour. He brought an action against those responsible for the aerodrome, but if my memory is right he did not win.

A fortnight after the finish of the Bournemouth meeting, the Blackpool meeting opened on July 28th, for three weeks, organised by the Lancashire Aero Club. The weather was bad for the most part, and from the point of view of finance the meeting was not a success, but some good flying was done. Georges Chavez, on a Blériot monoplane, broke the world's height record by 1,000 feet, his altitude being 5,887 feet, whereas

Tyck's, at Brussells, was 4,835 feet and Olieslager's 4,720 feet, Mr. W. E. McArdle made a remarkable flight in a high wind in a Blériot-Gnome. The speed of the machine was slightly over fifty miles an hour, and it is certain that Mr. McArdle had a stronger wind to contend with than Latham had when he made his memorable flight at Blackpool, nine months before. Latham just managed to fly a complete circuit, his machine never being driven back, although at times, as already mentioned, it was almost stationary; but Mr. McArdle, on a faster machine than Latham's Antoinette, was steadily driven back away from the aerodrome. And to show what enormous progress had been made in a year in aviation, Latham's flight aroused almost delirious enthusiasm, whereas Mr. McArdle's passed almost unnoticed. There were only eleven entrants for this meeting, Grahame-White (monoplane and biplane), Cattaneo, G. Chavez, Champel, M. Tétard, A. Drexel, Cecil Grace, W. E. McArdle, "Jones" (R. Loraine), A. V. Roe, and H. J. Harding. The prizes for the first week amounted to £300 a day. Each day a general merit prize of £100 was awarded, an altitude prize of £50, and prizes of £100 and £50 for the greatest aggregate distance. A special prize of £200 and a silver cup presented by the Lancashire Aero Club were also awarded to the competitor who achieved the most meritorious performance during the week, and the winner of this prize also received a valuable cup presented by the Hon H. Lawson, as a *Daily Telegraph* prize.

During the second week Mr. Grahame-White gave exhibition and passenger flights, having been engaged at a fee of £2,000 for exhibition flights alone.

From August 15–20 another £2,000 was given in prizes, and several additional flyers took part.

In the official programme of the meeting I notice the Car and General Insurance Co. offer "the Pioneer Aviation Policy" insuring against fire, accidental damage, third party claims and personal accidents.

The Lanark Meeting was held on August 6–13, several of the flyers coming straight from their first week's flying at Blackpool, and returning there when Lanark was finished. There was more flying at Lanark than at any previous aviation meeting except Rheims, and no one was even injured. Some had very narrow escapes, however, their machines being broken. A novel competition, too, was held at this meeting, a prize being given for the fastest mile and fastest kilometre with a flying start. Mr. A. V. Ebblewhite, the head official time-keeper, was chiefly responsible for these races. The test had particular interest as throwing light on the vexed question of the actual speed of aeroplanes which, over the ordinary course, with its sharp turns, could not accurately be determined. At this meeting, too, Mr. Drexel, the American airman, made a new altitude record. He climbed up to 6,750 feet; and Lanark aerodrome was 700 feet above the sea level to start with. The Gnome motor was again very prominent at this meeting, and was pretty generally adopted on the Blériot monoplane and the Farman biplane.

In the slow-flying competition no other aeroplane came near the Wright biplane flown by Mr. Ogilvie. It was fitted with the usual Wright motor, and maintained horizontal flight at 24.11 miles per hour. By clever use of the throttle Mr. Olgivie made the machine vary its speed at least 30 per cent., and in planing down with motor shut off the gliding angle was very small.

This meeting was held under the auspices of the Scottish Aeronautical Society, and the arrangements were far superior to those at Bournemouth. Much had been learned from the failure of others. There were twenty-two entrants, eleven of whom were British: A. Ogilvie, G. A. Barnes, L. Gibbs, G. B. Cockburn, B. Dickson, D. G. Gilmour, J. Radley, S. F. Cody, G. C. Colmore, C. Grace, W. E. McArdle, G. Chavez, A Drexel, Vidart, Champel, Cattaneo, Tétard, Blondeau, Audemars, Hanriot, Edmond, Kuller. Twelve of the machines were fitted with Gnome engines, six with E.N.Vs., two with Clergets, one with a Humber, one with a J.A.P., one with a Clément Bayard, one with a Green. The prizes amounted to £8,650, and, in addition, the Lanark Trophy was presented by Prof. Archibald Barr, president of the Scottish Aeronautical Society, and awarded with the first prize.

CHAPTER XVIII

PLAYTIME IN THE SKY

FLYING and ballooning are so different that two separate chapters might have been written on the sights and sounds that reward the air traveller. In other chapters some of these are described, and still it seemed to me necessary to direct attention to them more particularly, and to give a special section to them. And because the balloonist has the best of it in this respect, and is at leisure to enjoy aerial scenery, whilst only to his ears comes a music of nature unheard by the aviator or by those who remain at the bottom of the aerial ocean, his sensations must come first. As for the aeroplane, the noise of its engine effectually drowns all other sound, and even when the engine is cut off, and the machine is gliding down, the rush of air over wings and struts and wires makes it possible only to hear very loud external sounds.

I am alone in a very small balloon over Surrey on the last day of a beautiful May. So light is the wind that on that little voyage three hours and a half were taken to travel 16 miles, from Roehampton to Betchworth. There is scarcely a cloud in the sky. The sun is hot, and the balloon, being one of gold beaters' skin inflated with hydrogen, is very "lively". Hydrogen is much more sensitive to heat and cold than coal gas, and the goldbeaters' skin is not so good a protection as ordinary balloon fabric. The basket is quite tiny; two men in it would be a crowd! The rigging and all the appointments are designed for lightness. I am alone, and as the hours pass the loneliness becomes rather oppressive. This is quite different from aeroplaning, for there is little to occupy the attention, and scarcely anything to do with the hands. Plenty of time to look around and down!

Very slowly I approach a big wood. It would better express the situation were I to say that very slowly a big wood comes nearer to the balloon, for there is no sense of movement, and the earth below seems to be moving slowly past a stationary balloon. As the wood comes nearer I watch the aneroid and get a bag of ballast ready, for I know that over the wood the air will be slightly cooler, with probably a slight down draught due to convection, and that the balloon will immediately begin to descend; and I shall have to check that descent by throwing a little ballast.

Fifteen hundred feet up and almost absolute silence, broken occasionally by the barking of a dog heard very faintly, or by a voice hailing the balloon, and by an occasional friendly creak of the basket and rigging if I move ever so slightly. Then quite suddenly I am aware of something new.

The balloon has come down a little already, and I scatter a few handfuls of sand and await the certain result. But my attention is no longer on that, it is arrested by this new sound which I hear, surely the most wonderful and the sweetest sound heard by mortal ears. It is the combined singing of thousands of birds, of half the kinds which make the English spring so lovely. I do not hear one above the others; all are blended together in a wonderful harmony without change of pitch or tone, yet never wearying the ear. By very close attention I seem to be able at times to pick out an individual song. No doubt at all there are wrens, and chaffinches, and blackbirds, and thrushes, hedge sparrows, warblers, greenfinches, and bullfinches and a score of others, by the hundred; and their singing comes up to me from that ten-acre wood in one sweet volume of heavenly music. There are people who like jazz!

But the ballast has taken effect, and the balloon is steadily rising; the music becomes fainter; the wood slips away slowly towards the north.

The balloon steadily mounts to 7,000 feet, for the sun is very hot. Awaking as it seems from a beautiful dream I begin to think of a place to land. There are the southern slopes of the Surrey hills. I pick out Reigate, Betchworth, Dorking. Far way to the south I see the South Downs and the gleam of the Channel. But with the end of my ballast approaching I must prepare to land. My course will take me right over Betchworth, and there is a railway station which will save me a lot of trouble. I valve, and the balloon promptly begins to fall.

Rather a heavy landing, and I am down in the basket huddled up by the fall. Then it bounces, and comes down again almost on the same spot. I hang on to the valve until the balloon is empty enough to permit me to get out carefully as it falls slowly over and the people of the village assemble and offer help.

Elsewhere I describe another beautiful sound the balloonist hears, the music of a million waves unsullied by the rolling of breaking waves on sand or shingle.

As you ascend in any kind of aircraft the horizon goes up with you, and when you get to a fair height and look down the earth appears to be concave, for you are aware, by reasoning, of your height, and yet the horizon is level with the eye. Hence the saucer-like appearance of the earth from a high altitude, and not convexity which would seem to be the right appearance of a globe.

You ascend on a day that seems perfectly clear, and at four or five thousand feet you find to your surprise that between you and the ground is an intervening bluish, or it might be brownish, haze which softens outlines. You take a photograph expecting a very poor result, and afterwards find to your astonishment that the eye of the camera has pierced the mist and given you a clear picture.

Above you the sky becomes a deeper blue as you ascend, and when you have reached 10,000 feet and you look down again you find the haze appears no thicker than it did at half that height. You have passed through the impure, lower levels of the atmosphere, and every additional 1,000 feet makes scarcely any difference. The earth seems darker, though, by comparison with the greater brilliance and light of the sky above. And you thought there was not a cloud in sight; nor to the eye of the people below is there. Yet when you look round at the horizon you find that it is veiled by what looks like a ring of grey-brown cloud, the tops of which are an infinitude of tiny snowy peaks. So high are you that the peaks of snowy cloud may be 200 miles away. And they are not real clouds as understood by people on the ground. The appearance is due to the fact that you are looking through the lower levels of the atmosphere. Below that appearance of snowy peaks at the far horizon the people look up and bless a clear, fine day. From a high mountain you may often see the same effect. But unless the sun is very high only on the side opposite to the source of light is the top of the lower strata of the atmosphere lit up as white peaks. On the other side the mist is blue or brown.

You fly on, and there at the very edge of the world is a mountain of snow. It is 300 miles away, yet it could be covered by one of the capital letters on this page held near the eye. Remembering the distance you know that it is vast. Now you can see the weather over 300,000 square miles.

In some parts of the world the mist of fine weather is not so thick, for it is chiefly due to humidity. But on exceptional days even in England you may see a sharp horizon when you are 8,000 or 10,000 feet up.

But that big cloud we saw 300 miles away. Perhaps you would like a nearer view. Assuming the drift of the wind to be constant it would be easy, knowing the distance and the air speed of your machine, to calculate how long it would take to get there. But here is a mystery (to the earth man): there might be a town between you and the cloud, yet you might get to the cloud before you reached the town. That might be the case if the whole body of air were moving from the cloud's direction towards the machine. Nor would you reach the cloud any the sooner on that account, for the air speed of your machine remaining the same, its travel-speed against the wind is less by whatever is the speed of the wind.

One could go on for ever describing aerial scenery met whilst ballooning or aeroplaning, but I can only select a few striking notes. On one occasion I went up in a kite balloon at Croydon in a thick peasoupy fog, and at 500 feet we were above the fog and under the bluest of blue skies and brilliant sunshine. Out from the fog below came the hum of traffic; away to the north the fog surface was almost black with London's smoke; elsewhere it was like snow. Very strange was it to come down through the fog again for a few minutes out of touch with earth and sky, and then to land in a choking thick gloom hiding men at 10 yards distance.

I never look up at an overcast sky without thinking of the deep blue dome and the glorious sun above it by day, or of the brilliant stars and the bright moon by night.

The airman takes a very different view of clouds than the earthman. Sometimes clouds that are a mere annoyance to the earthman may be a deadly peril to the airman; and, again, clouds which turn the eaves into spouting fountains and fill the streets with mud may merely amuse the airman. Here is a vast rosy-flushed giant some 8,000 feet high, 50,000 feet long, 20,000 feet wide, good-humoured, smiling. A moment and the angle of the light is changed, and he is a slate-grey frowning mass, terrible. But the airman was never deceived, the monster's shape as seen from the aeroplane was that of an anvil, an inverted wedge, its apex resting on the shadowed earth. That is a typical form of the thundercloud; and sometimes their tops are like fairy cities wrought in gleaming snow, and to these fairy cities, which may be a mile or more high, the airman betakes himself on "iron wings that climb the wind," knowing that he can leave them when he will. (I write here of the airman in an aeroplane, not one in a balloon. And, by the way, a few of those descriptions are reduced from my articles in the *Observer*).

One day we put a couple of miles between us and the earth. The sky is blue. Round about are isolated lumpy clouds, dazzling white on the sun-side, grey in shadow, peaks and domes above, crevasses and caverns below. Between them the dull-hued earth is visible, its fields and towns a mere make-believe of a nursery in Lilliput. Forget for a moment that long irregular broad-scarred line where the earth's fair skin is ravaged as by some foul disease. Forget the points of red flame that gleam without ceasing, now here, now there, along that hideous line, here singly, there in ordered rows. Forget the dark smoke that rolls up from some burning town miles away.

Ahead of us is a huge dome-like mass which might be a hundred St. Paul's Cathedrals rolled into one. It is irresistible, but at the last moment we refrain, the lever is pulled back, and our chariot climbs over that dome of dazzling vapour that looks like snow as if the wheels were veritably ploughing its surface. Over its top we go, and down the other side, the pilot keeping up the illusion of "taxy-ing" over the snow. Then, instead of leaving it we turn sharp to the left, with the right wing canted up, and make a complete circle of the dome, the left wing sometimes brushing it and, it almost seems, in danger of being damaged.

Up here we are part of the wind itself, and we are slowly nearing home, for the wind is from the east. Whether we charge a cloud from front, or rear, or flank, our motion relatively to it is the same. We come to a series of little clouds with white peaky tops. We fly through the peaks, and I look back almost expecting to see the tops of them go falling down like thistles beheaded by a swinging cane. We roar through a big grey monster, and instantly are immersed in dense fog. Then out again into the bright sunshine; and, looking back, no sign of our passing save a swirling of the vapour, which quickly subsides.

Another day we are in the presence of the majesty of storms, and fly a path between two of them, each miles long. We, who are in fine weather, see the lightning darting among the clouds and from clouds to earth on either side. And the air we are in is in sore trouble, and the machine rocks and rolls.

A friend of mine saw a very remarkable sight. His machine was in the centre of a great circle of cloud, the earth being visible immediately below. Presently a huge, sharply-defined cloud formed in the centre and steadily rose, spinning round and boring upward. It was a rather terrifying spectacle, and he avoided flying into that gyrating mass. Probably, however, the cloud merely made visible a condition of the air common enough and often experienced by aviators, a rising current or eddy and offering little danger to the experienced airman of to-day.

What is called a "glory" is seen either from a balloon or an aeroplane, and is a ring of rainbow round the shadow of the aircraft thrown on the cloud below. It travels along with the airman, rising and falling, enlarging and diminishing as it sweeps over the rolling hillocks of vapour. The colours are very brilliant at times, pure coloured light on white sunlit snow. Often from a balloon it is possible to enjoy this sight more at leisure, for usually a balloon is in the same current of air that is moving the clouds below on which its shadow is cast, and in that case the "glory" may be seen for a long time in one spot.

Over Brooklands on one occasion, at a height of 8,000 feet, with much mist and cloud below us, I saw the upper reaches of the Thames in thin, wavy, interrupted lines, silver threads on a brown-grey cloth; in France, in similar conditions, a long, straight, thin blade of steel like a sword from below up to the high horizon—nothing else of earth visible.

Except when flying near the ground an airman has no sense of speed, for there are no near objects, stationary or moving, by which to judge. Clouds are of little value in this connection, for clouds are of unknown and uncertain size. When your train rushes through a station you know that you are going fast, but when it is away from the station and is not hemmed in by trees or embankments it seems to be going slower.

At 10,000 or 12,000 feet all sense of speed is lost, for the air which roars past and through the plane might be simply a hurricane hurling itself at a stationary flying machine. We know it is not that; but looking down at the kingdoms of the earth spread below us we feel as if the machine were a speck suspended in the middle of a great crystal globe, and the deep, unceasing roaring of the mighty engine might be the rumbling of the wheels of remorseless Time, or the solemn, endless drone of our spinning planet.

Far ahead suddenly another aeroplane is sighted, a mere toy; and when first seen six miles lie between it and us. It is a machine as powerful as ours, and we are rushing towards each other at a combined speed of 250 miles per hour. We cannot hear it, for the roar of our own engine drowns all other sound; but in half a minute the machine is level with us. Half a minute more and it is a tiny toy in the distance, and we feel alone again. Between the time we could identify it and the time it was out of range was a matter of thirty seconds, no more. So did Britain and German meet in the sky, turn and wheel, spar for an opening, either counting himself lucky if in that brief moment he could bring his gun to bear two seconds before his opponent.

CHAPTER XIX

BALLOONING TO SWEDEN

If I were arranging this book with proper regard for the chronological order of events this chapter would be the first, for it must begin with the chance which led me to read a wonderful book called *Travels in the Air*, by James Glaisher, Camille Flammarion, W. De Fonvielle, and Gaston Tissandier; and that good fortune befell me in 1885 or 1886. The book had been out fourteen years or so, for it was published by Richard Bentley & Son in 1871. It came my way when I was just entering upon a period of training for business at a famous subscription library at Brighton, long since defunct. One of my contemporaries in that establishment was Mr. E. V. Lucas, who was even then beginning to appear as a fairly regular contributor of verse to the *Globe*. He became a full-blown journalist long before I did; and from that time he went on with that easy stride of his from success to success and winning the enviable place he now holds in the hearts of the discriminating reading public.

What a marvellous book is *Travels in the Air*, with its fine coloured prints of celestial scenery and its beautiful lithographs and woodcuts! It came to me as a revelation, and has remained with me ever since as an inspiration. The French production is, if anything, finer than the British; and I have them both. They are still obtainable in second-hand bookshops, but I advise any who seek it to make sure of securing an edition with the coloured plates.

Years, many years, passed, and it seemed I would have to go through life without a closer acquaintance with ballooning. And then chance again came to the rescue. Some ten years after I had become definitely a journalist it fell to my lot, merely because I was available for duty on a certain day in May, 1907—the 25th of the month and a Saturday, to be exact—and was willing, to make an ascent in a balloon. The balloon, which was the largest in Great Britain and was named "The Mammoth", had been built by the late A. E. Gaudron, a Frenchman domiciled in this country and connected by marriage with that famous ballooning family, the Spencers. Several journalists were invited to take part in a trial ascent, and among them was the late Bennett Burleigh, the war correspondent of the *Daily Telegraph.*

Including the aeronaut, Gaudron, there were fifteen of us crowded in the big basket of the "Mammoth", which, fully inflated, held 108,000 cubic feet of gas, and which measured 59 feet in maximum diameter. The ascent was made from Wandsworth gas works, and for most of us it was the first experience of ballooning. Apart from the unpleasant crowding which prevented freedom of movement, the experience was intensely interesting. We drifted very slowly westwards up river, and we saw several other balloons, for the Aero Club were busy that day on one of their sporting events. The air was warm and clear, and the views were remarkable to our inexperienced eyes, although we never went higher than about 2,000 feet. Towards the end of the trip thunderstorms were gathering around, and it was decided to land before we got into their influence. We landed as lightly as a feather in a field about three miles west of Basingstoke, having taken three hours to travel 60 miles; and no sooner had we landed than the rain came down in torrents. With one of the party I walked back to Basingstoke, and being drenched to the skin put up for the night.

Gaudron had mentioned casually that his idea in building the balloon was to break the world record for distance, which at that time was held by the Comte de La Vaulx for a journey of 1,197 miles. He had an associate for this enterprise, the late J. L. Tannar, and he wanted one more. He agreed that if I could get a newspaper to send me as representative and bear a share in the cost the thing could be done. Without delay I got the *Daily Graphic* interested, and arrangements were made for me to join in the attempt.

The best time for such an attempt was the autumn when strong south-west winds are expected and cooler temperature increases the chances of duration of a balloon voyage for the reason there is less loss of gas through expansion. Moreover, the nights are lengthening, and the even temperature of night-time helps for the same reason, besides bringing a moderation of the temperature fluctuations which soon put a limit to a balloon's journey. The "Mammoth" was taken to the Crystal Palace, where there was an excellent supply of good gas laid on through a main in the grounds for the special purpose of ballooning, and we held ourselves in readiness to start on the first suitable evening.

We waited for weeks for a propitious weather forecast. But there was much to beguile the waiting, for one day the "Nulli

Secundus" airship, after a voyage from Farnborough over London, was brought down in the Crystal Palace grounds owing to the difficulty of getting back to Farnborough in a head wind.

The incident brought many well-known aeronauts to the scene, and I made the acquaintance of Colonel Templer and Colonel Pollock there. Also I met a link with the remoter past of ballooning, none other than Mr. T. Wright, who had been associated with the great Coxwell, and had known Glaisher himself. Truly I seemed to be in touch with the whole history of ballooning from the days of the Montgolfiers themselves as I shook hands with him; and, as a matter of fact, the chain is complete and easily traceable.

Our opportunity did not come until October 12th, and then, alas, it proved to be only half a chance. It took many hours to inflate a balloon of the size of the "Mammoth", and inflation had therefore to begin before noon for an ascent at sunset. By the time inflation was more than half completed it became only too evident that the wind was not strong enough, and that its direction, almost true south-west, was not the most favourable; what we wanted was a wind of at least 30 miles per hour, and as nearly as possible from due west.

However, when a balloon is inflated an ascent is made unless some exceptional obstacle arises, as for example, a thunderstorm. In this case there was not the slightest reason why we should not start, keeping an open mind as to the advisability of crossing the sea. Among those who saw us off was Major B. Baden Powell, and there was a crowd of spectators who had been seeing a football match in the Crystal Palace grounds. They were much interested in our equipment and the two-storey car with a rope ladder to the top platform, where we carried some of the ballast and our water supply.

Much of the following description in this and in the next Chapter is reduced from my articles in the *Daily Graphic* (now incorporated with the *Daily Sketch*).

We left towards the north-east and watched the upturned faces of the crowd sinking away below us, and the Palace itself, already lit up for the night, receding towards the south-west.

Within a few minutes of leaving the ground we were rewarded with one of the finest spectacles ever seen by the airman. London's 150 square miles were spread westwards before our eyes as we crossed the Thames not far from Greenwich, and gazed at the vast panorama. A crescent moon was not powerful enough to dim the stars, and we seemed to be poised in the centre of a vast illuminated globe whose dark sides were frosted with silver and gold, the roof glittering with the constellations seen, at our height of 2,000 feet, as they never appear to the eyes of the Londoner. Below us lay the millions of lamps patterning the great city, the wide, well-lit highways, such as Oxford Street, conspicuous, and the dark band of the river braceleted by the lights of the bridges. The roar of the traffic came up to us, an endless murmuring, and the whistling of trains and the barking of dogs came clearly to our ears.

Soon we were over the quiet dark country, and with nothing to guide the eye had frequently to read our instruments in the electric light with which we were equipped. But coming to high ground on one occasion we were seen, and a voice hailed us from below; and this enabled us to ascertain our position with more exactness than by studying the map. During the next two hours we slowly ascended to about 4,000 feet, and the balloon was in perfect equilibrium and needed neither valving nor ballasting. But the question whether we were to risk the sea-crossing became an urgent one. We were steadily approaching the coast, and for a long time had seen the occulting lights about Harwich and northwards of that port. We had to make a decision against time, and the alternative to a landing almost immediately was a crossing over the North Sea on an apparently straight north-east course, probably three or four hundred miles of water if the wind held, whilst if it went round ever so slightly to the south there was a possibility of drifting right up between Scotland and Norway.

Rapidly we weighed the matter up. The balloon was good for two days and nights, for we carried a ton of ballast and disposable material. The weather indications had not suggested any likelihood of change, and we always had the consoling thought that at a height of 17,000 feet or so a westerly stream of air is certain, so that, provided we kept strict watch on the time and did not leave decision until too late, we could fall back upon, or rather rise up to, the safety which that would afford. The one difficulty lay in the fact that for hours to come we should not be able to ascertain the direction in which we were travelling, for when over the sea and out of sight of fixed landmarks it is impossible in a balloon to know the direction of movement. There was just the faint chance that by dawn we might see a ship and be able to take a line on its white wake. Well, we agreed to go on, and we crossed the coast near Yarmouth, knowing we were in for a long night vigil over the sea.

It was cold, and although we were warmly clad the inaction one is forced to in a balloon, except at the rare moments of some crisis, keeps the circulation at a low ebb. We had some cold supper, with hot drink from thermos flasks. Before we left the coast, and shortly afterwards, Gaudron provided us with a novel spectacle. He had brought some coloured flares, and lowering these to the end of our trail rope he lighted them by electric current, so that first green, and then red and then white flares burst out below us, wasted their rays in the emptiness around, but lit up the balloon itself so that the great globe above us and every rope was dazzlingly illuminated. Then, as the fires died out the glorious stars were seen in multitudes and brilliance only seen in favourable conditions from mountain top or in dry climates. The sky was cloudless. Complete silence reigned save for the friendly occasional creak of a rope or the basket as one of us changed position.

The stars seemed friendly and close; Orion and the Great Bear majestic groups, the Pleiades a heavenly cluster, the Milky Way a celestial highway. But about one o'clock a sudden change occurred. At a great distance from us, but at about the same level, a great number of small fluffy clouds formed, and we were poised in the middle of the circle. Another ring formed nearer to us, and another. And we moved on, but with no perceptible sense of movement, with this weird escort. Once or twice far below us we could see the light of a ship. After two o'clock we fired another flare.

Now we witnessed the formation of cloud on a larger scale, more particularly to the north, and lower than the balloon, and gradually it extended until cloudland blotted out the sea entirely except for an occasional patch of blackness in the grey. Above, the sky was clear, but to the south-west the stars were blotted out by a wall of black cloud. Soon after four o'clock a faint flush appeared in the north-east, marking the approach of the sun to his rising. The water in the wet bulb thermometer was frozen.

At five o'clock the light was strong enough to make a faint shadow. We were at 4,500 feet altitude. The cloud scenery now began to bestir itself. As if for our sole benefit it began a long series of wonderful groupings. Across the north-east sky a straight row of fantastic shapes appeared black as ink against the lightening sky. They resembled gigantic trees rearing themselves from a flat land covered with white mist. These grotesque shapes appeared to be the same clouds that half an hour before had passed slowly below us, then appearing indefinite and fleecy.

The dawn grew nearer, and a red tinge appeared behind the row of cloud trees, which became blacker and more sharply defined. A lovely green hue suffused the sky above the red. To the south the clouds were bluish grey. The stars were still very brilliant.

Almost suddenly the row of strange tree shapes lifted to a higher level, or we sank; then imperceptibly they dispersed and a series of mysterious and every-changing cloud forms took their place. One slate-grey, ponderous-looking mass occupied a giant's share of the northern sky slightly below us, but with its topmost peaks and domes about on our level. It was tremendous; and I find it is quite impossible to give any idea of the immensity and variety of these changing scenes. In the far south a limitless stretch of cloud peaks looked like Switzerland moulded in snow.

At 5.58 the sun rose over the edge of the clouds, his beams instantly producing startling changes. I took several photographs, but the films unfortunately were lost in our landing.

We could see the sea between the clouds below us, dark grey and covered with almost microscopic waves which looked like frozen ripples so sharp and clear did they seem. But we could see them move and break into tiny patches of foam, and these enabled us to observe the direction in which we were travelling. It was still north-east, and I made a calculation that we should reach land about half-past nine, and it was fairly certain that we should leave the sea at some point on the Danish coast.

The sun began to warm the balloon, and we began slowly to climb, and the clouds began to clear away. We went up to 7,400 feet, and we sighted a small warship travelling northwards. All this time the changing cloud scenes gave us plenty to see and enjoy. The rising sun threw the cloud-valleys into contrasting shadows of every degree of blue, from cobalt to deepest indigo.

I sighted land at 8.20, a long, narrow line of slightly darker colour than the sea and, unlike the clouds, fringed on the under side by a narrow edge of white. It may be confessed we were considerably relieved to know that we had not drifted off our course, and that we should now be able to ascertain our whereabouts and direction with exactness. Moreover, we had established a world record, the longest sea-crossing by balloon that had ever been made. It only remained to identify the spot at which we should pass to land, and to measure the distance between it and the point on the English coast we had passed the night before. We had taken 9 hours 20 minutes from land to land. I believe that at the date we crossed the North Sea had been crossed by balloon on only two previous occasions, by Sir Claude de Crespigny and Mr. Simmons on July 30, 1883, and by Dr. Kurt Wagner and Herr A Koch on April 11, 1907.

We passed over Jutland at a height steadily increasing to above 8,000 feet. The air was wonderfully clear, and the clouds had almost entirely disappeared. We saw immense distances, and we came to know afterwards that we were observed by multitudes of people. We threw out messages attached to long streamers of paper. Steadily we climbed to 11,500 feet, and as the morning wore on the sky to the north became dark with clouds, whilst over the land a bluish mist formed so that it was necessary to watch our course with great care. So we passed over Skagen and the Skaw, across the straits to the coast of Sweden, our first view of which showed innumerable rocky islets with many fishermen's houses.

Our direction was no longer constant, and possessing no good map of Sweden, for we had not intended to go so far north when we made up our equipment, we became very uncertain of our position, and the accumulating clouds increased our disquietude. Moreover, Tannar was not at all well, and was feeling the fatigue of the journey. Unable to see the earth for a long time, and in Gaudron's experience the appearance of the clouds suggesting storm, and having some reason to fear we might have changed our course and increased our speed, our skipper said we ought in all prudence to seek a landing rather than risk getting out to sea. The appearance of a great flat field of cloud decided him, for he believed it indicated water. Possibly if we had been more confident of our direction, and if travelling in that direction we might have reasonably hoped to achieve the object of the expedition, we might have been tempted to carry on; but in the circumstances in which we were placed, and swift decision being necessary, there can be no doubt that Gaudron did the wisest thing.

He valved hard, and we came down through the clouds at a great pace, letting the balloon fall as fast as it could, and no doubt descending at about 1,500 feet per minute. As the gas poured out through the valve and the remaining gas contracted in the increasing atmospheric pressure the neck of the balloon sagged up, and the bottom made a concavity which acted as a brake on our downward rush. The air made a great noise pouring over the rigging, and altogether it was a rather alarming experience to a comparative novice. Suddenly we emerged from the clouds, and there before us was a coast-line with waves breaking angrily upon it, and a forest stretching to the water's edge and sending up a great volume of sound of the wind tearing over it and tossing the tops of the trees.

Gaudron was afraid that in what was evidently to be a rough-and-tumble landing, with no prospect of being able to hold the balloon, one of us might be carried away with it. In a moment he explained this, and said we must all jump clear together the moment the balloon struck. He had some trouble with the ripping panel, finding that it would not work without more attention than he could then give it; but even if it had worked there might still have been some risk of one of us being dragged away. Accordingly he told us to kneel on the edge of the basket, legs outwards, and we did this, following his example, when at about 800 or 1,000 feet. He was now throwing out ballast as hard as he could in order to break the fall, but at the same time was prepared to valve, and in a few moments we could see the trail rope was in the trees and tearing through them, setting up a continual jolting in the basket. Now we all hung outside, holding on to the rigging, and thus we crashed down through the trees to the sound of rending branches, nevertheless striking the ground heavily so that, willy-nilly, we all fell off. The balloon paused for a moment as if to take breath, and then away it went with a force a hundred men could not have stemmed; and I who snatched at the trail rope just as it was gathering speed was simply hurled aside like a mere twig, rolling over and over on the ground. I promptly let go. We saw the balloon go out to sea, its basket half under water with all our gear, and we saw it clear the water and sweep away towards the north where sky met sea in level line.

That we ran some risk of injury from the trees by hanging outside the basket is undeniable; but there was the greater peril of one of us being carried away over the water, and therefore Gaudron ordered wisely.

An hour or so afterwards we picked our way out of the wood and met some of the inhabitants. We had landed near Brackan on the shore of Lake Wener, which is nearly ninety miles in length. The people had seen us, and were looking for us, but not where we met them. They imagined we were still in the balloon! The balloon, as we discovered on the next day, had been blown across the lake to Tösse, and had made a perfectly good landing on its own account. We went on and recovered it with most of our property intact, but my films, alas, were spoilt by the water. Many of the instruments were broken, and our overcoats had tumbled out in the Lake somewhere.

Now one of the greater delights of ballooning is the landing in a strange country, and the kindness of the people one meets and the hospitality they show, both as to its manner and as to its warmth.

On that trip our distance as the crow flies was 703 miles, including the sea crossing of 360 miles, and we were 19 hours 5 minutes in the air.

After returning to London we received several letters from Denmark and Sweden, from people who had seen our balloon pass over. Some enclosed maps with the course of the balloon marked. From this correspondence I select one letter which I can quote in full because it describes the emotions aroused by the novel spectacle of a balloon in those days and those regions. It runs:

"We cannot resist the temptation to tell you how delighted we are to have seen that seldom, wonderful sight of your balloon on the 13th of October, half-past ten in the forenoon. We are living in a little town in the north of Denmark between Aalborg and Thisted, a mile from the sea Skagerak. We heard the children in the garden cry: A balloon, a balloon! We ran out and did not believe our own eyes, seeing a white round thing flying rapidly through the fresh sunshining air like a wonderful bird from a fairy tale. Through a telescope some of us could even confirm that there were persons in the gondol, and a strange feeling of joy and enthusiasm overcame us. All the day we only thought and spoke of the wonderful view and discussed from where and to where you were going. Two days after we had the great joy to read in the newspapers about your bold trip over the North Sea, half a mile over the globe on the high road of the future never before used of any human being. We congratulate you to the record you have set.

TWO SISTERS."

Here is one from a newspaper office:

"Dear Sir, My hearty congratulations to the fine balloon expedition. The balloon has been followed here in Vendsyssel (the northly part of Denmark) with the greatest attention. The airship crossed Vendsyssel in a shrew line, such—

(a sketch map was given here)

and by Skagen (the northly point) it was lost to sight. It was yesterday about 12¾. The flight over Vendsyssel 60–80 miles took about 1½ hours. Everywhere attached the balloon the greatest attention. The population stood and stared in the air and went up on the highest spots to see it. The great papers have brought long compends of the descriptions, and now we are all waiting to find a postcard from the "Mammoth".

The last sentence refers to the postcards we had promised to drop from the balloon. Many were dropped and some found and posted.

The late Hon. C. S. Rolls invited us to dinner. The Aero Club at that time had very few active members, and premises that were little more than an office. Four of those who signed my menu are dead. Tannar, Gaudron, and Clift were taken by illness. Rolls was killed at the Bournemouth Flying Meeting. Most of the signatories are mentioned in these chapters.

CHAPTER XX

BALLOONING TO RUSSIA

DURING the next twelve months I was trying to interest London editors in aeronautics, and found it difficult enough to " place " an occasional article. Gaudron was making balloon ascents, and was very anxious to arrange for another attempt on the record in the autumn of 1908. One day he told me he had found a new enthusiast, one Captain E. M. Maitland of the 3rd Battalion Essex Regiment, and he brought him along to meet me.

Maitland and I formed a friendship which lasted until that tragic day in August, 1921, when he lost his life in the disaster to the airship R38, at Hull. At the time I met him first he was just beginning his apprenticeship to aeronautics, and he told me that one of the things which turned his mind to ballooning was my description of the voyage to Sweden. By the time I first had the pleasure of making an ascent with him, on October 31, 1908, he was becoming quite an experienced hand, eager for every opportunity, and keen to try new things. One day we went to the Alexandra Palace with Gaudron, who was to conduct parachute descents, and both Maitland and I were to be " dropped ". The wind, however, was too high for this to be done without some danger, and I for one did not regret it. Maitland was sorry enough; but, as we all know, he more than made up for that disappointment in later years.

I think Maitland who, by the way, had seen active service in South Africa, was the most uncomplaining, imperturbable man I ever met. He never counted danger, and when he met it he never showed a sign. But above that quality of his I place his quiet endurance, and his indifference to discomfort. Cold or wet or on " short commons ", or the victim of the indifferent cook or the clumsy servant, he would smile good-humouredly or make some philosophical remark. What a contrast this to the demeanour of the egotist who resents any interference by Providence or man with his ideas of what is due to him!

Maitland, of course, was heart and soul with us in a project for beating the world's ballooning record, and I am sure if

Gaudron had proposed to balloon across the Atlantic he would have agreed. In the end Maitland obtained permission from his C.O., and I fixed up an arrangement with the *Daily Graphic*. We made preparations, and in due time took the balloon to the Crystal Palace and waited for the wind.

Again it played us false, but this time even more so, and we were to make one amusing failure before we were favoured by the conditions which took us to Russia. On Saturday, October 31, the balloon was being inflated when the wind dropped and veered towards the south, so that if we started we were in for a slow run in a direction a little east of north. We ascended at 4.40, still entertaining a faint hope that at a height of a few thousand feet we should find a westerly stream. I am afraid we were rather trying to persuade ourselves against all reason; however, there it was, and we drifted off so slowly that London was being lit up for the night while we were still over it. It took us two hours to reach Stratford, and the whole experience became rather boring and most disappointing. We burned a few coloured flares to pass the time, and at a pace scarcely appreciable, and mounting gradually to about 6,000 feet, we began the long night in cloud and mist to the disturbing sound of fog signals on the railways below us. There was some occasion for anxiety, for sooner or later we should be in the vicinity of the sea, and quite certainly we should have to land before we got to it. Our chief occupation was that of ascertaining our locality and measuring off times and distances on the map.

We came down low at nine o'clock, so low that we could hear the rushing of a stream, so close that myriads of pigeons, either awakened by our voices or by the silent passage of the big balloon across the sky, stirred from their resting places and fluttered about in the air. Between ten and eleven we disturbed a vast number of pheasants, partridges, and other birds, whose cries and the flapping of myriad wings made a deafening volume of sound. Dogs barked, and we heard the tinkling of sheep bells and the trampling of hoofs over turf. We heard the shrill calls of peewits and the twittering of many small birds.

Soon after eleven o'clock we were near Cambridge, and we were still in its neighbourhood at midnight, for we heard the hour struck by the chimes of the Roman Catholic Cathedral and by four or five other churches and Trinity College. Cambridge by night from the air is a long pageant of lights. We lit some flares, and were hailed from a road below by a party of noisy youths, one of whom we heard declare " the balloon is on fire "!

At half-past two we were in thick fog and wrapped in silence. Fog all around, below and above, and suddenly close to one's elbow, as it seemed, the bell of a church clock striking three o'clock. Every moment we expected to hit that church!

We identified March by the hubbub of shunting and the noise of steam whistles in that busy railway centre. Then we crossed open country with our trail rope down, its end snaking along over the grass and disturbing dogs, birds, and sheep. The trail rope was very useful, for it enabled us to verify our direction of travel by looking at the line at which it stretched out from the basket. Ducks and geese we heard, and presently seagulls; and some of these we saw fluttering out of the mist like ghosts and vanishing into oblivion.

On we trailed now over sand, and now splashing through water, and we knew that our trail rope was skimming over the western end of the Wash. We were heading straight for the coast, and if we carried on past that we had nothing but sea before us, for we should pass to the west of Norway. Now our slowness was our consolation: we could land easily just when we pleased; but it was time to think of our landing. Looking at the map we decided we could afford to wait for the dawn, and before five o'clock the first glimmer made the blackness grey, and soon turned it into pearl. And then we landed in a big field, as lightly as a leaf, near Fishtoft, three miles from Boston. We valved the gas out of the balloon, had breakfast, and waited shivering for the inhabitants, who duly arrived, as they invariably do whenever and wherever a balloon or an aeroplane comes to earth.

We did not get a real chance until November the 18th, and then we made a mistake, excusable perhaps in the circumstances. We abandoned the rule that for a long balloon voyage the right time to start is after sunset, in order that several hours of travelling in equable temperature may be obtained. By day the balloon goes up full of gas, and the neck must be left open so that gas may escape as the balloon climbs into reduced density of air. In the cool of night, however, it is usually easy to get into a state of equilibrium and to keep there with the occasional discharge of a handful or two of sand ballast. But by day the disturbing effect of the sun's heat is felt, and there is more rapid waste of gas, whilst very often it is almost impossible to prevent the balloon shooting up above its equilibrium, with the result that it begins to descend again, and its descent has to be checked by throwing out ballast. Now no matter how carefully this is done—and the art of ballooning is largely a matter of extreme watchfulness and care in the use of ballast—

a little more ballast is thrown out than is absolutely necessary, for not only is it a question of equilibrium, but the balloon's impetus of descent has to be checked in time. Then directly the ballasting takes effect the balloon begins to ascend again; and again it goes up to a point slightly above equilibrium. In practice it will be found that a balloon's altitude path is usually a series of climbs and descents, with the height of the peaks gradually increasing, until the time comes when ballast is nearly exhausted and only enough remains to check the bump on landing. That, too, is a matter of calculation, reducible to a formula which takes into account the size of the balloon and the weather conditions. Of course where for any particular reason the balloon is sent up to a greater height than necessary at first for equilibrium purposes; if, for example, the pilot seeks a favourable current high up, ballast and gas are used more freely, and the even progression of altitude peaks is not shown.

But the fact is, on this occasion our past experiences had made us nervous of the tricks played by the wind. We felt that the good westerly wind blowing on the morning of November 18th might fail, and when we saw the balloon fully inflated towards noon we could not brook delay, and away we decided to go. If only we had trusted the wind I am confident that instead of making the 1,117 miles of our journey to Russia we might easily have gone on to 1,500 or 1,600 miles, and thus have broken the world's record with plenty to spare. Instead of coming to an end of our resources late in the evening of the following day, and being compelled to land in high wind in darkness, I believe we might have gone on through that night, in which case undoubtedly we could have carried on for the best part of the day after. This, however, is not certain; and in any case I do not doubt that were the same circumstances again to arise the same decision would be taken by any experienced balloonist.

As luck would have it, not only did we start before noon, but the day was curiously warm and muggy; and we went into alternate sunshine and cloud, making the task of keeping a constant level quite impossible, and causing us to climb to a considerable height before sunset on the first day and thereby losing a lot of our precious gas. We left the Crystal Palace at 11.5 a.m. and drifted down Thames and over Chatham. Coming down on one occasion we nearly touched ground somewhere near Sheppey. Only now and then did we see the land at this time, but we caught a glimpse of Whitstable and then we were lost in the clouds and did not see Margate although we passed close by it.

Over the sea we decided to make the experiment of trailing, for which purpose we had a sea-trailer consisting of a long metal cylinder so contrived that we could regulate the water contents in it. We let it down, but at the speed at which we were travelling, probably about 28 miles per hour, this trailer proved too great a drag, and the balloon swiftly drove towards the water, whilst the bumping of the trailer over the waves shook the basket violently. We were more than half way across the sea at this time, and close by us were two fishing trawlers with the men on them busy with their nets. So far as I could see the men never even looked up at us!

We threw ballast out frantically, and only just in time did this take effect, this and the increasing weight of rope deposited on the water and taken off the balloon as we swept down. Before the balloon began to climb again we had come down to less than ten feet from the waves. But then we went up irresistibly, carrying the sea trailer and its contents with us and, despite its weight, soaring up to 7,000 feet right into cloudland.

Going back a few minutes, I must recall an interesting experience when we were over the water, and before letting the trailer touch it. We were far from the coast, and could not hear the thunder of waves breaking upon reefs or beach. But below us were the North Sea waves with white tops where the wind caught them, and we could hear the incessant murmur of the commotion of waters as the countless millions of waves and ripples sang together. Surely there is not in nature any sound quite like this, and only in a balloon can it be heard, for by the shore one hears only the turbulent noise of the waters breaking on land, and in any sort of ship the noise of the ship itself makes what to our ears would seem discord.

After soaring up with the trailer we saw below us nothing but a vast rolling sea of cloud, and the sun, now westering, shone feebly through a thin veil of higher cloud. And we were losing gas rather seriously. Soon we descended again, and coming through the clouds saw the coast of Belgium quite near us in the gathering dusk. We could see the bottom of the shallow sea; and now with declining temperature the balloon became more manageable.

The sun was setting below a dense belt of mist in the west, illuminated with every degree of orange, red, and brown light. The eastern sky was a deep pure blue; and in the north, between the blue and the flaming sun, the sky above a field of sunlit vapour was a limpid green.

We crossed the coast a little north of Ostend, faintly distinguishable in the darkness and, carefully watching our course, made out Antwerp, and later on Elberfeld and Dusseldorf.

Many of these towns made brilliant pictures in the night, especially Dusseldorf, with its brilliantly lit river embankment and its bridges. And after Dusseldorf a busy group of towns with tramways and factories and furnaces.

Our height through the next few hours did not vary much from 6,000 feet, and we kept rising and falling steadily through a layer of clouds, sometimes above it in sight of the stars, and sometimes below it trying to discover our locality, but now finding this rather difficult in the absence of known landmarks. We could see that our direction had not changed, but we could only try to estimate the speed at which we were moving towards Russia. The country became almost deserted, and we only occasionally saw the lights of a small town. But at about 4 o'clock we saw far away in the east a thin patch of milky haze indicating a great expanse of lights and evidently a big city. We discussed this, and thought it must be Leipzig; although I put in a vote for Berlin.

We were not long in doubt about the identity of the city which gradually unfolded itself and stretched across half the horizon. Leagues of lamps at Potsdam and Charlottenburg, and the great expanse of light beyond declared Berlin. We had all seen London by night from the balloon, but there was something in this view of Berlin that was most inspiring and encouraging. Seventeen hours from London to Berlin! We were, indeed, crossing Europe. We gazed down and discussed the Kaiser and his works, and had much talk about airships and aeroplanes, Gaudron pinning his faith to the airship like the good lighter-than-air expert he was—and it should be remembered that he had actually made and navigated an airship—and both of us naturally deferring to his professional knowledge and feeling that the scarcely believed exploits of the Wright Brothers and Santos Dumont and the others might after all come to nothing.

With Berlin fading away to the west, and the dawn breaking, Maitland and Gaudron both went to sleep, and I closed my eyes as I sat huddled up in my corner yet keeping half an eye ready for a glance at the altimeter, and a hand ready to test the statoscope (this is a delicate instrument which, when a rubber tube is pressed shows whether the balloon is ascending or falling, no matter how lightly). Then came the full dawn, and we stood up to welcome it and also to wish Gaudron many happy returns of the day, for Nov. 19th was his birthday.

Across the light in the east regiments of vapoury figures slowly stalked. It was easy to imagine that these grotesque shapes were inhabited by spirits akin to their weird forms. There was strange commotion in the field of grey fog. Wisps of thin cloud would suddenly rise here and there, and as the light increased the cloud shapes became better defined. Never at rest in the general movement eastward, varying currents of air carried some portions of the cloud-field faster than others. There were movements of the irregular surface up and down. Largely these effects must have been due not to actual independent movements of parts of the cloud-field, but to our changing position in relation to them. Woolly hillocks passed and repassed each other, rose and fell before each other, and against the background of the lightening sky they appeared for all the world like small moving pasteboard targets in a shooting gallery, only white and soft-edged like frisking lambs.

The morning advanced, and it became colder and colder. We went up to 10,000 feet, and came into small crystals of snow; and the vast patchwork of fields far below us began to show white lines to the windward of furrows and ridges. Our direction was E.N.E., and our speed from London averaged, so far as we could tell, about 32 miles per hour. The thermometer fell to 15 and 17 degrees of frost, and the ballast bags began to harden, so that we had to chip lumps of sand out for ballasting. The snow was collecting on the balloon, and this hastened the inevitable descending; and despite throwing out one or two solid bags of ballast, one of which we saw fall through a frozen pond making a clean round hole, down we came until the trail rope with its metal cylinder touched ground with a jerk and swung off again, and before we could ballast enough to get a big lift on the balloon the trailer struck the corner of an outhouse of a lonely farm and knocked down some of the brickwork, sending a violent tremor up to us in the basket.

This would never do, so as we steadily climbed again Gaudron said we must haul that trailer into the balloon again. See us then steadily hauling on to the rope, and only managing to get it in an inch at a time. And there were 300 feet of it, thick rope with a long metal cylinder at its end, and we were climbing up to a height where the heart begins to flag. We stuck to it, and at last succeeded; and of course with every yard we coiled in the burden became less. Then we detached the cylinder, and again let the rope out. The trail rope acts as an automatic ballaster, and when the balloon is trailing, as it can do safely and agreeably over open country, the trail rope keeps it in trim without any interference from the pilot. As more rope is deposited on the ground the balloon is to that extent lightened and tends again to rise, and as it rises it lifts more rope off the ground, and thus its ascent is checked. So you can go on for miles in favourable circumstances and in a light wind.

Once coming down from a great height towards the sunlit cloud-field we saw the shadow of the balloon surrounded by a rainbow halo called by balloonists a "glory". Now we were facing the prospect of another night in the balloon, and as the dusk came down we crossed the Russian frontier and were fired at by some zealous sentry, although news of our expedition was supposed to have been communicated to all military and civil authorities in these regions. But with the darkness came steady snow, and as the evening wore on we climbed steadily through 17,000 feet of falling snow, a real storm, and no matter how fast you may be travelling (unless you have the trail rope on the ground acting as a slight drag) you feel no wind and have no sense of speed: the trail rope hangs vertically and still.

Matters became serious, for our ballast had frozen solid; it had been a grave oversight to bring damp sand, but in ordinary ballooning it is suitable. When we had to ballast we ballasted far too heavily, and we were in fact confronted with the problem of soon coming to an end of our ballast and at the same time of climbing to such a height that the subsequent run down would become uncontrollable, and we should be forced to throw away our outer garments in order to check the final landing speed of the balloon. Some rapid thinking became necessary; and meanwhile the thermometer had frozen, and beyond the fact that we knew it was below zero we did not know how cold it was. Maitland characteristically admitted it was "a bit chilly".

Clearly we could not risk going on much longer, for if we protracted the journey beyond a certain point by ballasting we should be courting disaster; and the moment came when it was imperative to decide to land where and how we could. We decided at 17,200 feet. We were all rather worn out, and it was easy in the darkness to imagine strange forms in the gloom out of which came occasional flakes of snow whirling in as the basket slowly turned. It seemed incredible that the earth was 3½ miles below us, and I could imagine seeing a dimly-lit palace, and a woman descending its marble steps, a woman carrying a lamp. My companions admitted having queer fancies when at times we sat for long periods without speaking, and Gaudron reminded us that the strain of peering into the darkness plays tricks with the eyes.

We came down steadily from that great height, Gaudron throwing our last bags of ballast out, but this appearing to make little difference. Then as we neared the earth and heard the roaring of the wind through the black forest he told us to prepare for a bad bump and a long drag. Just before he ripped the panel open, and this he did not in the way of ordinary ballooning, that is, by waiting after the first bump and then ripping as the balloon rises to the top of its bounce and is just about to plunge down again, but without waiting for the bump and at a height of at least 100 feet! We could see that we were travelling at a great pace, and it was inevitable that a rough landing was in store; therefore it was imperative that the balloon should be deflated at the bump and have no chance of getting up again.

In the last few moments we saw the lights of a cottage. We heard the rending of the balloon panel as Gaudron ripped, and with a shrieking of wind in our ears and the flapping of the almost demented balloon, while we held on for our lives by the safety lines inside the basket, hanging with our limbs as relaxed as possible, we waited for the crash.

It came like the crack of doom, and I thought every bone in my body must be broken. Everything in the basket was in wild confusion, but there was, or seemed to be, utter silence until the wind seized the balloon and lifted us again, so that there was a second crash almost as bad as the first. And still we held on, for there was worse to come, and we knew it. Pandemonium again outside; and then we began to move, the basket dragging along over ice and snow, through bushes, and seeming to gather speed until we were sweeping along like an express train in the darkness and with only our tough basket saving us from having our limbs torn. And that is the wonderful thing about ballooning: even in such an extreme case as ours the basket is a safeguard, and all you have to do is to hold on until the balloon comes to rest. We finished up at last, and the basket turned over so that we were imprisoned underneath it, a most unusual thing to happen. The basket was full of snow and grit, and our faces and necks were wet and muddy.

It took a good ten minutes to extricate ourselves, for we had no light until one of the batteries was found and we got an electric lamp to work. We were on ice, near the edge of a small lake. The balloon was spread out over it, a tangled mass of fabric and cordage. It was snowing hard, and blowing a gale. Our first care was to find the cottage of which we had had a glimpse during the descent, and we set out in the darkness, helped by our electric torch, but having to guess from the signs of the country, now hidden by deep snow, which direction to take, and with quite a chance we might have to camp out with the balloon for the night.

We got to the cottage, and after much persuasion the good peasants in it, who were scared almost out of their wits by our appearance—strange people, knowing not a word of their language, not being able to account for our presence there, and there was blood on Gaudron's forehead, for he had been slightly cut in the fall—their reluctance was not surprising. However, their good hearts got the best even of their fears of the police, who might drop on them for harbouring strangers lacking police permits, and we were admitted and given hot tea from a samovar and, what was better still, comfortable and perfectly clean, although rough, beds on coarse sacking and straw.

We found plenty of difficulties next day, when a brief thaw set in, for after collecting the balloon and getting it on the road in order to go to the railway we came up against the authorities. We had landed at Mateki Derevni, in the province of New Alexandrovsk, and we were about six miles from Abela. Later it was verified at the Royal Geographical Society that as the crow flies we had travelled by balloon 1,117 miles, and had thus broken the British, but not the world, record. We traced our drag over the snow: it was full three-quarters of a mile.

The station-master at Abela proved to be a very officious personage; and I have no doubt he had to be. Anyway, he and the police between them put us under strict surveillance, and said we must be escorted next day to Dvinsk, about 35 miles away. We stayed at the one inn at Abela, and did not fare badly, although the accommodation was somewhat primitive, and early next morning we entrained; and we were sent third-class, surely an unnecessary privation even though we may have been suspects. Third-class in Russia is not the comfortable travelling it is in most parts of England. One meets pretty bad things in all countries, of course, and people are not too clean even where they have all the facilities for keeping clean.

We got to Dvinsk, and had to wait hours for the right officials. We were driven into the great fortress, and were interviewed by terrible people with bristling beards and quite unnecessary swords, and thus at last we came to Colonel Muller, the Chief of the gendarmerie, and he simply could not do too much for us. We were treated royally, and were given the splendid State apartments at the station for bedrooms. We were feasted, and were shown the sights.

At our first luncheon (given in the station restaurant), the first decent meal we had had, it seemed to us, for a long time, several officers of a Russian infantry regiment which had the previous day been guarding the line for the Empress's train, joined us, and we had a decidedly hectic time drinking, among other toasts, to the Anglo-French-Russian entente. Here is the menu:

Hors d'œuvres
Caviar Russe
Massia brod Siegra
Losser Eschina (lax)
Sumgar (smoked salmon)
Shchee
(A Russian soup found in perfection only in the best restaurants in Russia)
Sterled Porouski (sterlet)
Porsob Porsonok (sucking pig)
Gouriski Casha (a sweet)

In our rough landing, by the way, Captain Maitland lost five sovereigns, and all our seeking for them was in vain. That was so like him! While coming across the North Sea and looking at his pocket aneroid this instrument, which had been given to him by a friend, was jerked out of his hands in one of the bumps set up by our sea trailer as it ploughed through the waves beneath us. We saw the aneroid drop into the water. But the loss of the money somewhat hampered our little fund, and we had to watch expenditure during our return journey. We stayed two days at Berlin, and one at Utrecht.

Before our voyage I had said, " We might with luck get as far as Siberia." On my return to London I was given a copy of the *Star* with a cartoon by my friend, Frank Morland, who had drawn me in the clutches of two gigantic Russian soldiers who were threatening me with Siberia. " But," I was protesting, " I want to go to Siberia ! "

In London Mr. Frank Hedges Butler invited us to the annual dinner of the Royal Aero Club, which was held on the 10th December.

Just before Christmas I went to Antwerp to give a lecture on our balloon voyages to Sweden and Russia before the Royal Geographical Society at that City, and there very great interest was taken in the story of the trips and the slides made from my photographs. At the dinner preceding the lecture I begged for autographs, one of the signatures was just " XIIs "; it was that of Mr. Twelves, who was my very kind host in Antwerp. Others were Maurice de Cock, the secretary of the Royal Geographical Society, and Sir Cecil Hertslet, the British Consul General.

From Antwerp I went to Paris in order to see the aeroplane exhibits at the Grand Palais, and there I met M. Louis Blériot, M. Henri Farman, M. Esnault Pelterie, and many others famous in aviation.

CHAPTER XXI

AIRSHIPS

THE first airship I ever saw was Dr. F. A. Barton's, when, in 1900, it ascended from the Alexandra Palace, travelled over London one calm evening, and returned to its shed. It was an interesting experiment, and should be given its due place in the history of airship enterprise. Dr. Barton sought to combine the principles of the airship and the aeroplane by placing three controllable triplanes between the gas bag and the long car. By the use of the aeroplane surfaces he obtained a certain amount of control in the vertical dimension without valving or ballasting. The late Auguste Gaudron, the balloonist, who captained the voyages to Sweden and Russia described in the last two chapters, built this airship. Gaudron used to complain bitterly at the discouragement Dr. Barton's enterprise received.

The next British airship was built by Messrs. Spencers, and was fitted with a 30 h.p. Simms motor. It was seen at the Crystal Palace in 1902.

The airship has always enjoyed the publicity of hostility. From the days when the late Sir Hiram Maxim called it "the jelly-fish of the air" it has been the object of attacks the very fierceness of which makes them suspect. For some reason the airship arouses passions not evoked by the aeroplane, yet its record of disaster compares well with that of the flying machine. I suppose one reason is that the progress of airships is in the nature of things slower. These craft cost more, and take longer to build, besides which the technical and engineering problems involved are, if anything, more formidable. Costing so much, they never had the advantage possessed by aeroplanes of the services of hundreds of enthusiastic amateurs, whilst in this country the climatic conditions are unfavourable to airships, except the biggest and most powerful. While, then, the public have seen the aeroplane develop year by year in steady progress, they have received the impression that airships are always battling against tremendous odds. Added to that, the votaries of the heavier-than-air side have resented diffusion of energy due to expenditure on lighter-than-air rivals.

During the war even the small airship was vindicated both by the service it rendered and by its comparative freedom from disaster; yet the Zeppelin raids, culminating in the great disaster when seven or eight of these huge vessels were wrecked in a day, gave the anti-airship party ammunition for their campaign.

After the war, unfortunately, the airship became in large measure the shuttlecock of party or Service politics. When the Air Ministry, with the consent of the Admiralty, put airships on the shelf owing to the country's financial straits, airships immediately became the desire of the pro-Admiralty party (between which and the Admiralty itself a distinction must be drawn). Much ingenuity was displayed in a campaign urging that the airship, because it is a "ship", should belong to the Navy; and there is little doubt that it was sought in this way to insert the thin end of the wedge which would ultimately give the Admiralty its own air service of some kind or another. Unfortunately, history shows that when the Admiralty had airships they starved them, and then deserted them, or (as someone said) "threw the body away"! Hitherto when the Navy has had control of aircraft it has shown complete inability to understand the problems and the possibilities.

Opposition begat excessive partisanship, and the advocates of airships too often exaggerated their case, thus offering a vulnerable point to their assailants. To such an extent was this manifested, that it was only necessary to venture on a reasoned examination of the limitations of airships in order to incur the wrath of the enthusiasts, which wrath in some cases led to attacks and scheming of a nature which could only be excused on the assumption that the end justifies the means.

Later still, when the enemies of the separate Air Ministry became frantic in defeat, the airship was made the occasion of a campaign against the Ministry, ill-informed and unscrupulous to a degree that even now, with the evidence before my eyes, seems difficult to credit.

With the example of Germany before us, and despite the fact that Zeppelins were at least demonstrating good reason for further research and experiment, British airship pioneers were not merely left alone, they were treated with scorn. What a different history might have been that of the late E. T. Willows had he been given the slightest encouragement by the authorities, and for that matter by his countrymen. And I would make the same remark with regard to other workers in this field, including those of the Balloon School at Farnborough.

The first flight of the "Nulli Secundus", the first British military airship, brought to light two classes of critics. One—a very small class—praised Colonel Capper and S. F. Cody and appreciated their heroic struggle against innumerable difficulties. The other—and to our shame the larger class—saw only what they would have called the "comic side", greeting every set-back with insane laughter. The misadventure to the "Nulli Secundus" at the Crystal Palace in 1907 was a case in point.

Here are a few particulars of that airship. The gold beater's skin for the envelope cost no less than £2,000. Of course it was not merely a single layer of skin, but consisted of between fifteen and twenty thicknesses. To make this envelope, measuring 110 feet in length by 90 feet circumference, no fewer than 200,000 oxen contributed. In buying this material for the "Nulli Secundus" and the other balloons for the War Department, the demand created was so great that the price of gold beater's skin was sent up 20 per cent. The market price was about 12*s.* 6*d.* for 100 skins, each measuring about eight inches by thirty inches. But the joining together of this enormous number of pieces entailed a prodigious amount of labour, and this labour was one of the most serious items in the reckoning. Between the layers of skin a certain amount of silk thread was used, and this item alone reached £30.

The motor of the "Nulli Secundus" cost £500. Then the framework, the netting, and various other items had to be added. The airship contained 56,000 cub. ft. of hydrogen, generated by the electric process and compressed in cylinders. The cost of commercial hydrogen in cylinders was about a penny a foot. Therefore the cost of the gas in the "Nulli Secundus" was about £230.

British airship activity was at a low ebb. I find a note of an Aerial League meeting, at which Captain (now Group-Captain) F. Cave-Browne-Cave stated that it was intended to ask the public to subscribe £50,000 for the purchase of a Zeppelin. Nothing came of that proposal, I believe. But rumours and scares were frequent. Thus, it was claimed by a certain Dr. Boyd that he had built in secret a small airship and had flown it secretly in Ireland! On May 1 came news from Belfast that people had witnessed "the flight of a dark body bearing a brilliant light, which passed over the city at a great height".

"That was the occasion when we accomplished our longest flight," Dr. Boyd told a reporter. "On that night we flew across the Irish Channel, and I have plenty of proof of the fact. Where we crossed, the distance from shore to shore is about ninety miles. We accomplished the journey in one night, in one long, continuous flight, and we attained an average speed of 32 miles an hour.

"The form of construction of my airship is known to very few people besides myself," the inventor continued, "and they are all pledged to secrecy. Unlike the usual form of airship, it has no car suspended from the envelope, neither is the envelope exactly cigar-shaped, but rather oval, and is divided into three separate bags. The works are placed in between them, the motors having a closed-in compartment to themselves at the end. From each side extend wings like an aeroplane.

"The ship is 120 feet long, and has engines of 300 h.p.—a great difference from the Zeppelin airship, which is 446 feet long, and has engines of only 220 h.p. It is partly due to the fact that I have such wonderful engines, and partly to the formation of the gas-bags and the 'direct-drive' that my flights have proved so successful. Another feature is the number of propellers. There are four on the machine at present, and these can be increased to any number up to thirty-two. I can carry, and have carried, three men, and enough petrol—roughly 600 gallons—to last for 1,400 miles.

"I have submitted my invention to the War Office, and when I have made sundry alterations they are going to send officers to witness trials. One alteration the War Office officials require is that the airship should be larger. Personally, I am very strongly in favour of fleets of small-size airships. They are less cumbersome than large ones, easier to manipulate, and therefore better suited for tactical purposes. I am lengthening the airship to 200 feet and increasing the engines to over 500 h.p. I shall also increase the number of propellers to eight or more, and when that is done I shall be able to guarantee a speed of 45 miles per hour. The airship will be able to carry no less than 1,200 gallons of petrol; the number of passengers will also be increased to eight; and in this connection I might mention that we already have a roomy cabin on the airship in which, during our recent night trials, we were able to take periods of rest in hammocks. As I have already stated, our longest continuous flight was crossing the Irish Channel, but we have travelled a distance of 350 miles with only one descent."

The remark to the effect that small airships are to be preferred seems to have been made in rather vital misapprehension of the fundamental fact that with increase of size most of the difficulties of airship design and navigation diminish; and it is not clear how an airship of the size stated could carry 3½ tons of petrol and eight passengers.

In June, 1910, the British Army airship "Beta" came by night over London with Colonel Capper, Lieut. C. M. Waterlow, and Mr. T. J. Ridge on board. Ascents of airships in the dark were rare, and, indeed, only twice previously, in France and Germany, had the hazard been taken.

At 2 a.m. hundreds of people in London saw, or rather heard, the approach of the airship. It was seen at Richmond, Battersea, and over St. Paul's Cathedral. The ascent was made at 11.40 p.m., and the course set by the stars. When the railway line was reached at Frimley the track was followed until Brooklands was reached. Then a straight line for St. Paul's was taken, the Thames being crossed three times in its windings, at Thames Ditton, near Hurlingham, and near Battersea Park. The dome of St. Paul's was circled at 2.15 a.m., and the return journey with a following wind was made at between 25 and 30 miles per hour.

Dawn was just breaking as the return journey was begun. The main Portsmouth road was struck at Hounslow and followed through Staines and Sunninghill to Farnborough. The return journey was completed in a little over 90 minutes. An average height of 1,000 feet was maintained and the engines were not run at full throttle.

The "Beta" was only 104 feet in length, and was propelled by engines of 35 h.p., against the 450 feet length and 500 h.p. of contemporary Zeppelins. She had been constructed for experimental purposes and as a training airship for the Army.

In 1910 the late E. T. Willows began a series of airship voyages. From his biography, which I wrote when I was on *Aeronautics*, the following notes are taken:

"He was the only civilian, apart from Government employées and a few professionals, who devoted himself to the construction of airships, and his experiments were carried out with his own limited resources. For many years he received no Government support whatever, and he had not even the encouragement the early experimenters in aviation had of the competition, advice, and experience of other workers in the same line.

"He was gifted by nature with two advantages for the work—a small frame with no superfluous flesh and a sunny disposition not easily discouraged by difficulties and adversities, of which he has had a bumper share.

"His first experiments in aeronautics were carried out in the summer of 1905, when he constructed a small airship of 12,000 cub. ft. capacity driven by a 7 h.p. 2-cylinder engine. This machine was used for short flights with a view to obtaining data and experience for the construction of more powerful and larger machines. He experimented with different systems of driving, elevating and steering controls until he was able to perfect a small single-seater airship, in which he made return flights over Cardiff in 1909.

"In 1910 he had so improved this machine that he was able to make a cross-country flight of about 40 miles from Cheltenham to Cardiff. This was followed by a further flight in August of that year from Cardiff to London by night, this being the longest trip by airship made in Great Britain up to that date. (His airship was fitted with a 35 h.p. J.A.P. engine and was 82 feet in length.)

"He improved the type, and by building a slightly larger machine was able to fly with a passenger from London to France by night, eventually reaching Paris. This was the first airship to cross the English Channel from Great Britain to the Continent, and was entirely of British manufacture.

"After making several flights over Paris, he returned to England and started giving demonstrations at various large towns. One of these was given at Watford, in March, 1911, in connection with the United Services' Tournament.

"He was unable to obtain any encouragement or promise of support from the War Office at this time, but in 1912 received an order for the construction of a small two-seater airship for the Admiralty, who used this for training their pilots in conjunction with a small airship which they had taken over from the War Office. This airship was carried on the Admiralty's books as Naval Airship No. 2.

"In 1913 he built an airship with which he trained pilots at Hendon. In the early part of 1914, he was asked by Mr. Holt Thomas to organise a staff and equip a factory for the construction of airships and balloons, and it was here that a small airship of his design was built and supplied to Lord Fisher's order for admiralty experiments in conjunction with the anti-submarine work. Willows did important work on kite balloons, and in connection with the 'apron' defence of London during the war."

It is interesting to recall early airship flights. From the pilot's own account of the voyage from London to Cardiff it appears that before Willows left Cardiff he had to repair a rent caused by a big flint thrown at him by a (no doubt fully enfranchised) British citizen! He said:

" I started about three minutes past eight p.m. from East Moors, Cardiff, where are the sheds in which I have been working for the past five years. I had to go a quarter of a mile or so towards the city to get to the seashore. I had decided to make the Somersetshire coast as near Clevedon as possible, and there I was to pick up a motor-car, in which my father was, the object being for the motor-car, with its headlights, to show me the route. Unfortunately, after going six or seven miles or so towards Bristol, the car had one of those periods of trouble which come to even the best of them, and I was left to make my way eastward alone.

"There was an off-shore wind of eighteen or twenty miles, and after I had kept along the coast a little to find out that all was right I headed across the Channel. I did the fourteen miles to the Somersetshire coast in thirty minutes. I did not arrange to have boats out, but I thought it better to wear a life-belt in case of accident. From Cardiff to Clevedon I kept the ship at a height of about 500 feet. As a matter of fact, that was one of the best and most comfortable bits of the whole journey. The wind was a trifle gusty, and was, indeed, quite troublesome at times, making the ship pitch like a yacht in a tide race.

"During the night I had to steer by the lights of towns. At Reading my altitude was 2,800 feet. As morning broke I picked up Ursa Minor in the East, and keeping the Little Bear on my starboard, I was able to make a pretty consistent course. I should think I stopped my motor a dozen times to make inquiries as to the direction in which I was going, and at one time I got some useful information in reply from a gang of platelayers.

"Just before I got to the Palace I threw out my grappling iron, but lost it in a tree. After that I was comparatively helpless, but for my trailer. As I was passing south-east of Lee it trailed across the roof of a contractor's shed. This brought the watchman out. I asked him to catch hold of the rope and he did so."

Towards the end of 1910 army airships were transferred from the military to the naval wing of the Royal Flying Corps, but an exception was made of the "Delta". Rumour had it that the Admiralty declined to buy this airship at any price.

"Delta's" failures were, perhaps, due to the inadequate means under which the Government compelled the British aeronautical services to labour. She was originally intended as a semi-rigid airship. She had an expensive silk envelope. On each side half-way up the envelope ran a horizontal longitudinal suspension band, so contrived that it was a defiance of mechanical principles in two respects. It was in the wrong position on the envelope: the suspension from a gas-container should be from a point below the equator. Secondly, the band was straight instead of being curved downwards at the middle, and therefore the weight of the car was dependent chiefly upon the ends, and was not equally distributed throughout the length.

The semi-rigid principle was obtained by means of a series of steel hoops, semi-circular in form, dependent upon the suspension bands, and running from bow to stern. The hoops were braced together by wires. The airship, therefore, rested on a more or less firmly knit shell frame.

Experimental ascents were made, not without danger. Mishap after mishap occurred, magnified by some newspapers into " disasters ", minimised by the officials. The first silk gas-holder came to grief, and a second was made. This also failed. Then the Royal Aircraft Factory made a rubber fabric envelope. But rubber expands under pressure more than silk or steel, and on being inflated the " Delta " took on the shape of a dromedary with more than its proper share of humps. It developed a hump for each compartment of the gas-container!

For the manœuvres of 1912 the " Delta " was needed in a hurry, and in the hope of making a satisfactory job the semi-rigid principle was abandoned, and she was converted into a non-rigid, still, however, with the suspension system dependent upon the straight equatorial bands. The compartments were removed, and she became an ordinary non-rigid, with one gas-container, at the bottom of which rested two air ballonnets. Naturally, the envelope twisted at both extremities of the suspension bands; and disaster was narrowly averted. To give a better angle of suspension the car was then placed further below the gas-container. But this did not have the desired effect.

At the Aero Show at Olympia the " Delta " appeared without its horizontal suspension, which had been replaced with "finger-point " suspension, looking like a series of outspread hands—each of the fingers holding a cord—on the outer side of the envelope. This system had proved satisfactory with gold-beater's skin envelopes.

How much was spent on this airship, first and last, no one knows; probably she cost as much as a Zeppelin. She could travel at the quite respectable speed for a small airship of forty-two miles per hour, but was of no value for campaigning.

Her capacity was 165,000 cubic feet, and she could lift a gross weight of 5½ tons. She carried a crew of six, and had two 100 h.p. motors.

Elsewhere I have had to refer to the fact that a slight setback or trifling mishap has greater consequences in discouraging the public in Great Britain than in France and Germany, and were I not convinced from countless other facts to the contrary I should find it impossible to escape from the conclusion that the Frenchman and the German has more grit and perseverance than the Briton. Here, however, we must not be misled by appearances: the probability is there is a larger public more sympathetic to scientific developments and work in France and Germany than in this country. Some will say excessive attention to sport is to blame, and will quote Mr. Kipling's famous lines; and they may be right.

Many big airship projects were brought forward privately in this country. One, in particular, I remember came from an Hungarian, Count A. de Bajza, who had invented a type of rigid airship which undoubtedly had many excellent features. One of these was its swivelling engine platforms, by means of which, the inventor claimed, he could change the direction of propeller thrust, and in this way secure some control in the vertical dimension irrespective of buoyancy, but, what was more important, make the ship handy to steer up and down, and thus overcome sudden loss of lift due to cold, rain, or down-draught. Lord Tenterden was much interested in this project, and for some years efforts were made to convince the authorities that an experiment would be justified. The war came, however; and it is impossible to say whether these efforts would have succeeded.

In the lack of experience it was natural mistakes should be made. For every single airship, the development of which, perhaps, represented three or four years of work, there were half a dozen generations of aeroplanes. And it must be admitted that, even more than the aeroplane, the airship suffered through failure to attract the highest engineering talent, which, in some cases, at any rate, might have prevented mistakes, although at the same time penalty would have been paid by too rigid an adherence to conventional engineering practice. One of the most remarkable mistakes was connected with the Wellman airship.

Airship history was made about that time by an attempt to cross the Atlantic by airship by Mr. Walter Wellman. That attempt failed because an equilibrator, a sort of marine trailing contrivance, dragged the airship down; and I had the melancholy satisfaction and verification of my own prediction in the *Observer* of September 11 and October 15, 1910.

Only in very calm weather can a sea-trailer be used. Any attempt to use one in a breeze of more than 15 miles per hour can only end in failure, and even disaster. The "America's" equilibrator was made up of gasoline tanks and wooden blocks, which would cause a strong drag in the water, with the result that even in a light breeze the airship would be heeled over towards the sea; and unless the sea was calm as a mill-pond the passage of the equilibrator through the water would be a succession of violent jerks calculated to play havoc with the machinery in the car. Now that is just what Wellman experienced.

The voyage of the Wellman airship, however, equalled, if it did not excel, the then record voyage of the Zeppelin (850 miles). It was not a record for duration for all aerial craft, that honour belonging to Colonel Schaeck, of Switzerland, for a balloon voyage of seventy-three hours; it was, however, a record in oversea distance, the previous best being 360 miles by the English balloon which crossed the North Sea in October, 1907. The Wellman airship set up a duration record and an oversea record for airships.

The *Morning Post* inaugurated a National Fund for an airship, and as a result a French Lebaudy semi-rigid was purchased. She left Moisson on Wednesday, October 26, 1910, and arrived at Aldershot after a voyage of five and a half hours (distance 197 miles). In coming into the shed, which was too small for her, the envelope was badly damaged. She was piloted by M. Capazza.

The Parliamentary Aerial Defence Committee had in 1909 ordered a non-rigid Clément Bayard, and there was much speculation as to which would have the honour of making the first airship voyage from Paris to London. Willows at about the same time was to make the journey in the opposite direction. This interesting situation had arisen through a delay in the delivery of the Clément-Bayard.

As regards previous honours, the Lebaudy type of airship had the best record. The semi-rigid type was strongly favoured by the French military authorities.

M. Clément brought the non-rigid over and landed at Wormwood Scrubs. Compiègne is about 40 miles N.N.E. of Paris, and the journey occupied six hours, an average of about 36 miles per hour.

The airship had to go through certain tests to War Office requirements. One of these required that she should not be wasting more than 1 per cent. of her gas per diem. She was, as a matter of fact, losing through deterioration and percolation at least 8 per cent. daily. But this was not considered a good reason for refusing to acquire her. Only a new envelope would have given a smaller figure.

The three airships may be compared from the following table, which gives their dimensions in round figures:—

	Capacity in cubic feet	Length in feet	Motors	Propellers
Clément-Bayard (non-rigid)	246,000	240	2 of 125 h.p.	4
Lebaudy (semi-rigid) ..	280,000	310	2 of 150 h.p.	4
Willows II	20,000	8	1 of 30 h.p.	2

All three were provided with one or more ballonnets, or air-bags, at the base and inside the main envelope. Into these bags air was pumped in order to make good the shrinkage of the envelope caused by leakage or contraction of the gas. (The expansion of the air-bag takes up the spare room in the gas envelope, which is, therefore, maintained at a uniform tension).

Apart from the differences in size, the principal point of contrast was that between the semi-rigid principle of the Lebaudy and the non-rigid Clément and Willows. In the Lebaudy the gas envelope rested upon a metal platform, or keel, almost throughout its entire length. The "République" was one of the Lebaudy class. Germany possessed the semi-rigid Gross and M 1, 2, and 3, in which, however, the rigid frame was not in close contact with the gas envelope, but at a short distance below it. The Italian airship "Leonardo" was another semi-rigid.

Both the Clément-Bayard and the Lebaudy were capable of carrying 20 persons, but the little Willows II would not dare to attempt the cross-Channel voyage with more than its one plucky navigator for crew.

The Willows II was unlike its big rivals in that its propellers were on swivelling shafts. The Lebaudy and Clément-Bayard airships were fitted with elevating planes, the angles of which could be altered for steering up or down.

The Lebaudy came to grief very completely and almost tragically at Farnborough during its official trial prior to acceptance on behalf of the committee representing the donors. It was driven against some telegraph wires, and, the envelope bursting, it was very seriously damaged, fortunately without loss of life.

On November 4, 1910, Mr. (now Viscount) Haldane, Secretary of State for War, went up in the "Beta" at Farnborough. This was the first time a British Minister had been a passenger in any airship.

In 1911 the British Naval rigid, No. 1, commonly known as "Mayfly," was completed. She was 510 feet in length, 48 feet in diameter and of 706,330 cubic feet capacity. Messrs. Vickers in conjunction with naval officers (the late Lieutenant N. F. Usborne and Lieutenant C. P. Talbot among them) were entrusted with its design.

It was stated at one time that it was hoped the "Mayfly" could be handled on landing by her own crew. As the number of the crew could not, however, exceed twenty or twenty-five, the hope could scarcely be realised. It took a good many more than five-and-twenty men to handle the Lebaudy and Clément-Bayard.

But the "Mayfly" was ill-fated from its start; there was something radically wrong with her. She never flew; and she always came in for ridicule, which was not always deserved. Even the meteorological officer contrived a joke. The Clerk of the Weather timed the first equinoctial gale for the very day upon which she was ready for her first voyage—and that after an unprecedentedly calm and fine six months, during which the airship was frequently declared to be "ready"! On the other hand, presumably in the hope that the British public were unaware of the fact that Zeppelin airships, which had sixteen or more gas compartments, had been making voyages during the previous three years, it was declared that the delays in the case of the "Mayfly" were largely due to the difficulties of inflating seventeen gas compartments!

I find the following note in April, 1912: "The 'Gamma'—a British military airship—has been making some successful flights during the past week or so. On April 22 it made a flight from the Royal Aircraft Factory, South Farnborough, round St. Paul's Cathedral and back. It carried six passengers, including Captain Maitland and Lieutenant Waterlow, R.E. The 'Gamma' started at 6.15 a.m. and on reaching Victoria by way of Wimbledon Common, turned up Grosvenor Place, along Piccadilly, and so down to the Embankment, keeping at a height of between 600 feet and 700 feet. St. Paul's Cathedral was reached at 8.20. The return journey occupied only fifty-seven minutes. The vessel can carry enough fuel, if required, for an eight hours' voyage. Two swivelling, four-bladed propellers enable landings to be effected without excessive use of ballast or loss of gas. On the previous Saturday it flew from Farnborough to Lindfield Common and back."

I think it was the "Gamma" which came to a mooring mast on Salisbury Plain, during the Military Aeroplane Competition in 1912. I saw an airship there for at least two days in roughish weather, and that must have been the first, or nearly the first, airship-mooring experiment.

Many airships have existed only on paper. Notable designs of this class were the Wulffing and the de Bajza, eventually combined. Mr. Wulffing also had designs for a floating airship dock. The following is quoted from an account in *Aeronautics*:

" A dirigible of a new type has been designed by Mr. John Wulffing, which possesses features combining to some extent the advantages of the semi-rigid and rigid types. Essentially, however, the dirigible is rigid. On the whole, and having regard more particularly to recent performances, the rigid dirigible has achieved the greatest measure of practical success. The passenger vessel ' Schwaben ' and the military dirigible 'MZ 9', constructed by Zeppelin, have attained a speed of 43 miles per hour. As light engines and propellers of improved design are evolved, there is no reason why speeds of 50 and even 60 miles per hour should not be reached before long.

" The one important, doubtful question that has to be dealt with is that of lifting power. The earlier Zeppelin vessels had a net lifting power of 18 per cent.; at the present day this has been increased to 20–25 per cent., a figure which, with improved methods of construction and materials, can no doubt be raised to 30 per cent. eventually. But for practical purposes even 30 per cent. is insufficient; in order to be really effective a military or passenger-carrying dirigible should have a net lifting power of 50 per cent. at least.

" Mr. Wulffing has abandoned the lattice girder type of framework, and has obtained his increased lifting-power principally in this direction. The main skeleton is built up of a number of longitudinal steel tubes curved to give the desired shape. At the nose and stern these tubes fit into a circular metal plate with a hole in the centre through which passes a threaded steel rod. These two rods are connected to a steel wire cable, the length of which is about 6 feet less than the length of the hull. When inflation is completed the threaded rods are drawn through the metal plates and screwed up, so that the entire framework is rendered rigid. In the interior the steel tube framework thus obtained is braced by means of cords or wires. The outer cover of the hull is constituted by a layer of specially treated fabric; the gasholders in the interior are divided into a series of compartments. The base of the hull is left flexible by the omission of the two steel tubes that would normally occupy this position. The latter are replaced by elastic strands. Thus, when the gas expands, owing to a decrease in atmospheric pressure, this elastic portion of the envelope will be distended, thus preventing the loss of gas which would otherwise take place.

" The following are the main features of the first dirigible which is to be constructed:

AIRSHIP

Horse-power	360	
Length of aerostat	338	feet
Greatest diameter	52	feet
Average diameter	39	feet
Average circumference	123	feet=41 yards
Average cross section	1,195	square feet=133 square yards
Cubic capacity	413,910	cubic feet
Total lifting power	28,000	lbs
Dead weight of ship	16,000	lbs
Net lifting power	12,000	lbs (43 per cent.)
Independent speed	82	feet (or 25m.) per second=56 miles per hour (90 klm.) "

On June 23, 1912, I wrote in the *Observer*: " The week's performances by German and French dirigible balloons will silence those who have been extolling the powers of the comparatively futile ' Gamma ' and ' Beta ', the two little dirigibles at Farnborough, and will give occasion to think to Ministers who have been letting fall unwise remarks about the advantages of the small dirigible for speed and manœuvring. The small dirigible has not one single advantage as regards capacity for speed or altitude flying. It cannot travel so far as the large airship; and it must necessarily be inferior in engine-power, not only absolutely but relatively. It cannot be made so strong or so durable.

" Neither the ' Gamma ' nor the ' Beta ' could approach the recent voyages of the big Zeppelins for distance or for height; as to attaining a height of close on 10,000 feet, as did an airship last week, they can only accomplish two-thirds of that altitude, and then only by sacrificing other capabilities. Nor can they carry a large crew, nor much ammunition or supplies.

" This is not to champion the airship as against the aeroplane; far from it. But every week provides additional testimony to the fact, so often claimed in these columns, that there will be uses for dirigibles in war, and shows us how inexcusable is the Government policy of leaving the development of this department more or less to chance, so that there is no airship building programme at the moment.

"The German airship on its voyage over Holland carried twenty-five passengers. It could as well have carried five passengers and a ton and a half more of high explosives.

"There has been a certain revival of interest in the airship in this country, and many letters have appeared in the newspapers. Some of these are characterised by extraordinary ignorance of the subject.

"But it is pretty evident, again, that Government policy is contingent, even in matters relating to naval and military equipment, upon the mood at the moment. When the Estimates were brought forward the public mind was fixed on the aeroplane, and because of the failure of the naval rigid airship (for reasons that had been foretold in *The Observer* eighteen months before), and one or two small mishaps to Aldershot airships, they would have none of them. So Ministers spoke grandly about the great aeroplane fleet Britain was to possess, and meanwhile assured the public that an eye would be kept on airship developments. In due course we shall be told that another naval airship is being built at Barrow, and that the Government contemplate purchasing or building two or three of the latest types of dirigible balloons for Army use."

The destruction near Atlantic City of the American airship "Akron", involving the death of its constructor, Mr. Melvin Vaniman, and four others, occurred in July, 1912. The "Akron" was Vaniman's latest and largest achievement in the matter of Atlantic airships. Its dimensions were: total length, 258 feet; diameter, 47 feet; length of car, 150 feet. The car was suspended from the gas bag by light steel tubes, and carried four motors—a 100 h.p. engine forward to drive the front propellers, two 80 h.p. motors aft to work two pairs of propellers that could be swivelled to any angle from horizontal to vertical, and a small motor to run a dynamo for electric lighting and wireless telegraphy. The controlling gear was set forward. The total value of the airship was said to have been £15,000, the cost having been borne by Mr. Sieberling, a rubber manufacturer.

It was intended to attempt a Transatlantic passage some time in the autumn, and the airship was undergoing trial trips. The last of these took place on July 2, when, after rising without any trouble and being steered out to sea, it was seen from shore that the airship was behaving erratically. Suddenly there was a flash of flame, a cloud of smoke, and before the sound had reached shore the car of the airship was seen to be plunging downwards into the sea. Vaniman was one of the aeronauts of the Wellman Arctic expedition, which wintered at Spitzbergen in 1907, and also was chief assistant of Walter Wellman in his abortive attempt to cross the Altantic in October, 1910.

A German Parseval airship, which was ordered by the British Admiralty for the Naval Wing of the Royal Flying Corps, flew from Farnborough to London and back, in June, 1913, her first flight in this country. She carried nine passengers, including Commander E. A. D. Masterman, commanding the naval wing, Capt. (now Air-Commodore) Murray Sueter, Lieut. (now Captain) F. L. M. Boothby, Chief Pilot Herr Schaak, and two German mechanics. She was 290 feet long and was fitted with two engines, each of 170 h.p., driving four-bladed propellers. Reaching a height of nearly 2,000 feet, she proceeded to London, passing over Brooklands and Sandown, and returned, after circling over the House of Commons.

Unless one were in the Service it was difficult in those days to get passenger flights in an airship without going to Germany and paying the rather high fare demanded. After the war I had a long voyage in the R 36.

The reference to Captain Boothby reminds me that he was one of the " Mayfly's " officers. During and since the war he has worked hard with and for airships.

In March, 1913, a German airship "scare" disturbed the public mind. There appears to be no doubt that Prince Henry of Pless, accompanied by ten German officers, in the passenger airship "Hansa" travelled over the North Sea, and across the Eastern counties. A circumstantial report of a mysterious airship cruising off the north-east coast by night was made at Grimsby by Capt. Lundy, master of the G.C. Rly. ss. *City of Leeds*, while outward bound from Grimsby for Hamburg on the night of February 22, 1913. He stated: "I sighted the body high in the air, travelling on a W.S.W. course, which would bring it over the Humber mouth. I called the attention of the second officer, Williams, to it, and we kept it under observation for some minutes. The sky was at first cloudy, but the moon cleared, and through binoculars we could make out the body of an airship with car and some other attachment. There can be no possibility of our being mistaken, the craft being fully revealed. It carried no lights. I mailed a report home immediately upon reaching Hamburg."

The airships which did or did not appear by night over the British coast were, if they existed, at all events not French. The two dirigibles, "L'Adjudant Réau" and "L'Adjudant Vincenot," for instance, did not leave their port at Verdun at the time named. French airships could not travel about secretly, and their movements were duly prearranged and recorded afterwards.

M. Capazza stated that the only airships capable of making such a trip were Zeppelins. He was entirely convinced from the evidence that a Zeppelin had performed the journey once—or perhaps several times—from Germany to England and back. Some corroborative evidence came afterwards from Germany, but I do not remember whether or not the fact was definitely established.

The Astra-Törrès airship acquired by the Admiralty, and erected in the Royal Aircraft Factory at Farnborough, was the fourteenth airship built by the French Astra Company, and the largest one of its type. It had a capacity of 247,000 cubic feet, and engines of 400 h.p. The trilobal cross-section of the Astra-Törrès increased resistance to the air, but this drawback was to a certain degree compensated for by the fact that the suspension wires were inside the envelope.

Early in January, 1914, with the ordering by the Admiralty of two Forlanini airships (to be built under license by Armstrong, Whitworth & Co.), and in consideration of the fact that these would bring the number of naval airships on order or in commission up to fifteen or sixteen, it was evident that questions of type and design became important. By the end of the year, 1914, the Navy would have possessed seven airships, namely, the Eta, the Astra-Törrès, the Parseval, the Vickers rigid, one Forlanini and two (of five) Parsevals then on order. An order for a rigid airship was also given to Armstrong, Whitworth & Co. The only airships in the list that would compare in the matter of speed with the latest German vessels were those of the rigid class. The Astra-Törrès could travel at a speed of fifty-one miles per hour (the trial was not over a measured course, by the way). She was not, however, the equal of the big rigids for duration of voyage. And the Forlanini airship to be sent from Italy, was no faster than the Astra-Törrès, her speed probably not exceeding fifty miles per hour. Priority in the estimate of the efficiency of airships is given to the quality of speed for the fairly obvious reason that it does in effect constitute the airship's most valuable performance quality, the quality that has hitherto been the most difficult to attain but that comprehends and is the key to the possession of other necessary capabilities.

I wrote in the *Field:* "Airships will be able to give valuable service provided they are not absolutely at the mercy of the aeroplane or of artillery. They can travel by night, they can transport small parties of men and land them to blow up a bridge or a railway line, they can carry heavy loads of explosives, they can travel long distances and need not descend in case of engine failure. But of what use are all these capabilities if the aeroplane, which in the next great war will be ubiquitous, can account for the airship?

"Those who do not favour gasbags assert that the speed and handiness of the aeroplane are so great that it can make rings round any airship, keeping it under fire all the time, and when at a superior altitude dropping bombs upon it. In the event of the failure of this form of attack, they say, a single-seater aeroplane with a pilot ready to face certain death, can, by the simple process of driving full tilt into an airship, wreck it completely. Let it at once be admitted there is no answer to the last argument; if any occasion demanded such a sacrifice there is little doubt that the man and the machine would be found. Even then, of course, his intention seen, the defenders on the airship would have a chance of bringing him down by machine-gun fire before he effected his purpose."

In June, 1914, the Britannia Airship Committee was trying to prepare for a trans-Atlantic voyage by airship. That committee was certainly a very distinguished one, including five Earls, one Duchess, four Barons, three Countesses, four Members of Parliament, three Admirals, and two Field Marshals.

In May or June, 1914, I went down to Farnborough to visit Colonel Maitland. We discussed airships, and I remember seeing in his room a big map of Germany showing every airship station. Little did we think that in a few weeks the Great War would begin! We used to discuss such a possibility in those days, and although it was regarded merely as a possibility, but by some of us a possibility made a probability by the impression Great Britain gave of unpreparedness and by the sedulously disseminated idea that we should never keep to our bargain with Belgium at the cost of war, we did not think war was imminent.

I remember meeting the late Captain C. M. Waterlow, R.E., whom I had long known, on that occasion. He had balloon certificate No. 18, and airship pilot's certificate No. 3. In March, 1913, on the "Beta" he made an 8¼ hours' flight from Farnborough to Reigate and Ashford and back.

It was to fall to Maitland's lot to take the lead in British airship development and, after the War, to try to overcome official and popular prejudice. He was one of the very few airmen who qualified for balloons, airships, and aeroplanes. He was No. 13 in the list of balloon certificates, No. 8 airship pilot, and No. 1281 (French) for flying. He commanded No. 1 (airship) Squadron R.F.C.

On October 18, 1913, he made a parachute descent from the airship "Delta". Early in 1914 he was given temporary rank of Lieutenant-Colonel while attached to the Naval Air Service, and was second to Commander (now Air-Commodore) Masterman of the Airship Section of the Naval Service. After the War he accompanied the R. 34 in her double crossing of the Atlantic in 1919, and was in charge of airships at the Air Ministry. He lost his life in the disaster to the R. 38.

CHAPTER XXII

GOVERNMENT AND FLYING

THE year 1907—the year in which I threw in my lot with aeronautics—happened to be the year which revealed the utter incapacity of the "authorities" to grasp a new idea. Here is a letter written by Lord Tweedmouth, First Lord of the Admiralty, to the Wright Brothers on March 7, of that year:

> "I have consulted my expert advisers with regard to your suggestion as to the employment of aeroplanes and I regret to have to tell you, after the careful consideration of my Board, that the Admiralty, whilst thanking you for so kindly bringing the proposals to their notice, are of opinion that they would not be of any practical use to the Naval Service."

Two years later the Channel was flown; within three years flights of one hour's duration were common; and in six years aeroplanes were used in the wars in the Balkans.

In the same year (1907) a "tank" with a "caterpillar" traction arrangement was tested at Aldershot; but the military authorities could not see any use for it! If military authorities had displayed any understanding of the new conditions which inevitably would govern warfare the four years deadlock of the trenches in the Great War would have been averted. I would recommend readers to turn to Col. J. F. C. Fuller's *The Foundations of the Science of War* for a more complete explanation of this situation. All I would point out now is that the same mentality in high places which hampered the development of aircraft in the first few years—mark this—is seeking to do so to this day.

Is it surprising that many of us question the wisdom of Admirals and Field Marshals, of Admiralty Lords and Ministers, who, despite the lessons of the war, still obstruct. And they are backed up by ignorant Members of Parliament and others whose reason in this connection appears in many cases to be warped by jealousy of the prerogatives of the older services.

In the first two or three years the official attitude—and by that I mean that of the Admiralty and the War Office—was one of gentle toleration. If an exalted officer or official desired to win a reputation for up-to-dateness he would say something vague about the possibilities of the future, and would do little to hamper immediate trials and tests. It was later, when the real meaning of development of aviation began to appear, that the active hostility was aroused of important interests, in whose view an unpardonable offence was committed by the Government which created a separate Air Ministry and Air Force. But—although this was not the chief reason for that step—the older services had brought this upon themselves by their mutual bickerings and by their incompetence and jealousies.

In 1906, as already related, Colonel Templer was superintendent of the balloon factory, and he was succeeded by Colonel (now Major-General Sir) J. E. Capper in that year, Col. Capper holding the position until 1909. Col. Capper did an immense amount of good work in the limited way at that time possible, with very little money to spend and surrounded and ruled by people who had no more idea that the flying age was about to dawn than so many moles. Also Col. Capper was a good propagandist for many years.

In 1909, Mr. Haldane separated the balloon factory and the balloon school, the latter being a military organisation. He placed Mr. (now Lieut.-Col.) Mervyn O'Gorman over the Factory, which was manned by civilians, and Col. Capper over the School. But Col. Capper was replaced by Major Sir Alexander Bannerman, Bart., in the course of a few months. I must place on record characteristic utterances by these two officers. At the Royal United Service Institution, in 1906, Colonel Capper, in a lecture on ballooning, said: "There is another and far more important phase of aerial locomotion which in the near future may probably have to be reckoned with. In a few years we may expect to see men moving swiftly through the air on simple surfaces, just as a gliding bird moves. Such machines will move very rapidly, probably never less than twenty miles per hour, and up to one hundred miles per hour. They will be small and difficult to hit, and very difficult to damage."

In 1911, Major Sir Alexander Bannerman, the head of the Army aeroplane section, said at a Royal Aero Club dinner that "for military purposes the aeroplane of the day was no advance on the machine which Wright flew in France."

The progress which had been made, however, was undoubtedly to a large extent due to improvements in the machine. Unfortunately for the head of the aeronautical division of the British Army, the Wright machine itself, which he brought forward as an example, had been improved. In the first place, its ascent was now independent of the elaborate starting rail with its derrick, pulley, and weights. Secondly, the aeroplane itself had been modified, and its manœuvring required considerably less skill than did the machine on which Wilbur Wright flew at Le Mans; the front elevator had been removed, and a movable tail at the rear of the rudder had been substituted, rendering the maintenance of fore and aft stability much easier. Again, the control which was fitted to the new pattern Wright biplane was superior to the earlier system.

Major Sir A. Bannerman said he wanted to see an aeroplane in which one could let go of the controls. The head of the aeronautical division was apparently ignorant of the work of Lieutenant Dunne!

In point of structural strength there was an undoubted improvement, although this improvement had not kept pace with the increased demands made upon machines by their higher speed and by the comparatively strong winds in which they were being flown.

I had occasion to write at the time: " It is not only Major Sir Alexander Bannerman who is keeping things back in military aviation, but there is at the War Office an officer of high rank who is really the final authority in these matters, and, as it happens, he is almost violently opposed to the idea that the aeroplane is of any use at all, let alone that it is the ' marvellous instrument of war ' which the French War Minister calls it."

We have always had the critics who deny progress; and always have the facts confuted them. Compare the performance of the first Cross-channel aeroplane, or of machines of the same power, five years after, then ten and fifteen years after; measure the pioneer Atlantic flights of Alcock and Brown against the great non-stop distances flown in 1926 and 1927.

At the end of 1909 the Government decided to appoint an Advisory Committee for Aeronautics. This step was announced by the Prime Minister in the following terms:

" The Government is taking steps towards placing its organisation for aerial navigation on a more satisfactory footing. As the result of a report made by the Committee of Imperial Defence the work of devising and constructing dirigible airships and aeroplanes has been apportioned between the Navy and the Army. The Admiralty is building certain dirigibles, while certain others of a different type will be constructed at the War Office Balloon Factory at Aldershot, which is about to be reorganised for the purpose. The investigation and provision of aeroplanes are also assigned to the War Office.

" With a view to securing that the highest scientific talent shall be brought to bear on the problems which will have to be solved in the course of the work of the two departments, the National Physical Laboratory has been requested to organise at its establishment at Teddington a special department for continuous investigation, experimental and otherwise, of questions which from time to time must be solved in order to obtain adequate guidance in construction.

" For the superintendence of the investigations at the National Physical Laboratory and for general advice on the scientific problems arising in connection with the work of the Admiralty and War Office in aerial construction and navigation I have appointed a special committee which includes the following names:

PRESIDENT

The Right Hon. Lord Rayleigh, O.M., F.R.S. (famous mathematician and physicist)

CHAIRMAN

Dr. R. T. Glazebrook, F.R.S., Director National Physical Laboratory.

MEMBERS

Major-General Sir Charles Hadden, K.C.B. (Master-General of Ordnance, representing the Army).
Captain R. H. S. Bacon, R.N., V.C.O., D.S.O. (first captain of the Dreadnought, representing the Navy).
Sir A. G. Greenhill, F.R.S. (former professor of mathematics at Woolwich).
Dr. W. N. Shaw, F.R.S. (Director the Meteorological Office).
Mr. Horace Darwin, F.R.S. (son of the great Charles Darwin).
Mr. H. R. A. Mallock, F.R.S. (consulting engineer).
Professor J. E. Petavel, F.R.S. (professor of engineering at Manchester.)
Mr. F. W. Lancaster (Motor expert)."

The Committee undoubtedly did much useful work, but this work did not have much effect in the direction of providing Great Britain with an air service sufficient for its needs. Committees of one kind or another have always in this country appealed to statesmen bewildered by the problems and disquietude provoked by the progress of flight.

The following note in March 1911 from my collection illustrates this:

" The Army Council have again taken the step of consulting aeronautical experts, a measure that shows that they are by no means resting satisfied. Following upon Sir Alexander Bannerman's speech at the Royal Aero Club dinner Mr. Haldane summoned an urgency meeting to decide upon the personnel of a committee. There is, unfortunately, nothing in this step that gives us much satisfaction. Some of the experts who are being consulted are the right men, as, for instance, Mr. Ogilvie, who combines with skill as a flyer almost unrivalled experience as an experimenter and pioneer. Mr. Ogilvie was making successful gliding experiments ten years ago, and has a knowledge of the science and the technicalities of flying equalled by very few. Certain members of the committee are simply popular flyers, some may not even be above the possibility of commercial bias. But even supposing the committee were an ideal one, it has no executive power. Its decisions may be submitted to the working departments, but we have no guarantee that they will be acted upon. We only know, by repeated bitter experiences, that nothing will be done without long delay, and that Great Britain's pace continues to be slower than that of rivals who have already established a tremendous lead. Until the general public make this matter their own concern, and compel the Government to move, and decline to be satisfied with mere promises, little will be done."

One could not help contrasting the British with the French military authorities. The accident at Issy, when the French War Minister was killed, did far more harm to British aviation, by giving an excuse to the unprogressive, than it did in France, where official and public opinion were more enlightened. The French Government, indeed, ordered a number of the type of monoplane involved in that accident within a month. If the disaster had occurred in England at that time that particular type of machine, quite regardless of its merits, would have been frozen out.

Meanwhile there were a number of flyers in the Air Battalion who were doing good practical work. Captains J. D. B. Fulton and C. J. Burke and Lieutenants B. H. and V. A. Barrington-Kennett and R. A. Cammell flew from Salisbury Plain to Aldershot and back, in July, 1911. Captain Burke later flew to Oxford and back; Lieut. Barrington-Kennett, with Lieut. R. H. P. Reynolds, flew to Aldershot and back. All these officers were enthusiasts and they left their mark on the service which was to develop into the Royal Flying Corps.

Lieut. B. H. Barrington-Kennett of the Grenadier Guards, No. 43 on the Aero Club's list of pilots (31 December, 1910), won the Mortimer-Singer prize in February, 1912, by a flight of 250 miles with passenger, on a Nieuport monoplane. It was said of him that, driven to despair by the refusal of the British senior officers to regard aviation seriously, he hit upon the scheme of flying round and round the house of General Sir Henry Smith-Dorrien, the Commander-in-Chief of the Aldershot Command!

The late Major J. D. B. Fulton was probably the greatest technical expert military aviation possessed in the days when it was under War Office control. He was the first officer to obtain the "Superior brevet", or certificate for advanced flying. He was appointed Chief Inspector of Engines and Aeroplanes, in December, 1913, and did very valuable work.

When he was in the R.F.A., in 1909, he built a monoplane on Blériot lines, and later he bought a Blériot on which he flew on Salisbury Plain.

In 1911, two gifts of aeroplanes were made to the Government with the objects of providing machines for training purposes and of stimulating Government and public opinion. It was not until sixteen years had elapsed that one of these two benefactors received an honour commensurate with his services.

The Admiralty accepted two aeroplanes which Mr. F. McClean placed at their disposal. Out of about 100 applicants who volunteered to learn to fly four were chosen, and the gratuitous services of Mr. C. B. Cockburn, as instructor, were accepted. Mr. Cockburn left his work at Salisbury Plain, including the building of a new machine, and went to Eastchurch to train naval pupils.

Mr. Horatio Barber gave four "Valkyrie" aeroplanes to the Government for the encouragement of aviation. Mr. Barber, about whose work particulars are given in another chapter, had at this period built twelve machines, and taught numerous men to fly, including several Army officers. Concerning his gift I find the following note:

"It has been objected that to present gifts of aeroplanes to the Government is to relieve them of the responsibility of buying them. Something is to be said for this point of view, but there is only too good reason to believe that the Government would never have been spurred on to do anything in aeronautics had it not been for such help as Mr. Barber's. There would not now be four naval officer aviators had it not been for Mr. F. McClean and Mr. Cockburn. Further, Mr. Barber's gift has done this excellent thing: it has brought the Admiralty down from the ridiculous position in which it relegated the aeroplane to the Army, and promised to concern itself only with the airship, for the Admiralty have accepted two of the Valkyrie machines. It requires but little insight to see that in the near future the Admiralty and the War Office will, through sheer force of circumstances, be compelled to buy machines and train men.

At the moment then, the gift of machines and the free offer of personal services to the Government does not divert trade from any particular quarter, but is calculated in the long run to make the Government and the country realise their duty in the matter of aviation."

The War Office unfortunately displayed a marked preference for foreign over British machines, and looking back to that period, now that it is possible to take a calm and dispassionate view, I see no reason to withdraw a word of the criticisms I put forward at that time. For an instrument which in war time would have to be designed and made in Great Britain, every encouragement should have been given, despite difficulties, to British designers, and none to the foreigner. But that does not mean that no attention should have been given to foreign developments, or that occasionally a foreign aeroplane or aero engine should not be bought.

At one time the War Office would go to almost any extreme rather than buy an aeroplane in England; and yet it was the policy of the War Office with regard to the other services either to manufacture their own material or to have it from British makers. They purchased a Nieuport, a Sommer, and a Deperdussin. There was, perhaps, good reason for buying the Nieuport, which was a distinctive machine; but as for the others, aeroplanes of at least equal merit could have been obtained in England. The War Office still chose to ignore the fine performances of the Cody biplane and the new Bristol monoplane. Apparently it had not heard of the Flanders and the Dunne machines.

Lieut. Barrington-Kennett was sent to France to bring back the Nieuport, Lieut. Reynolds for the Sommer, and Capt. Fulton for the Deperdussin. Lieut G. B. Hynes was sent to Douai, the head-quarters of the Bréguet School, where he learned to pilot the Bréguet biplane bought by the Government. Lieut. Cammell's Blériot two-seater was taken over by the Government, and Lieut. Cammell piloted one of the two "Valkyries" presented by Mr. Barber, which, for some inexplicable reason, had been kept locked up in their sheds for two months, although the Air Battalion was urgently in need of machines.

The French War Office held a competition for the design of military aeroplanes. It was confined to French machines, engines and material. The British War Office announced a competition, and opened it to the whole world, although there was one section for British machines. And in the meantime the War Office decided to buy no British machines until after the competition, although it was prepared to buy French machines successful in the French trials.

This was a severe blow to a home aircraft industry already suffering from neglect. Conceivably, however, the neglect, while implying that in the opinion of His Majesty's advisers British makers were incapable of making a passable aeroplane, might have been endured had the promised competition been an all-British one. French manufacturers opened factories in this country. The first to do so was the Deperdussin Company. The Bréguet, the Nieuport, and the Blériot Companies announced like intentions.

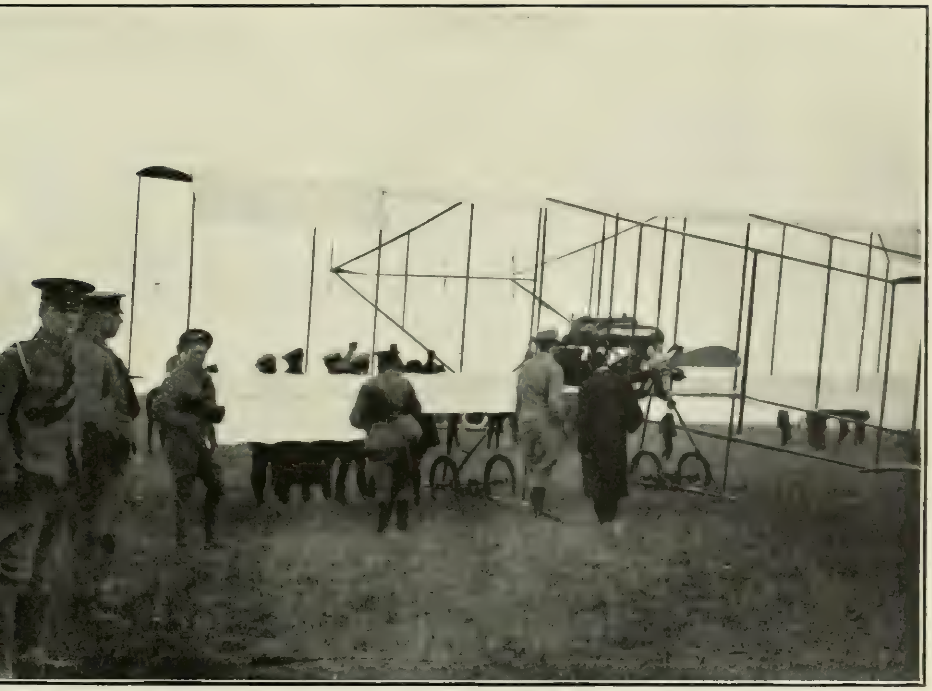
The War Office claimed the fault lay with British manufacturers, who failed to produce aeroplanes as good as the best, and that the British Government had to secure the best military aeroplane at all costs.

Owing to the activity in French workshops and the French flying grounds due to the long-continued practical help given to the industry by the French Government, the capabilities of French machines were always being demonstrated and advertised afresh. There were, in fact, in existence British designers who, given a chance, would have given an equally good account of themselves. But they lacked capital, and capital was naturally difficult to obtain for an industry which could not definitely promise business.

I wrote the following note in the *Observer* at that period (after describing the flights of an Avro): " I fear that few people realise what an exceedingly good machine the Avro is. If it had been a French production, the French Government would have ordered scores of the type, and it is highly probable that in that case the British Government would have patronised it. What Mr. Roe suffers from, no doubt, is the fact that he was the first Englishman to achieve flight on his own aeroplane in this country, and his early struggles are remembered and are always coupled with his name, whilst the continual advance he has made in design during the past two years, culminating in the present type of machine, is ignored. Mr. Cody provides another instance of the misfortune of having been too early in the field.

" There are at least ten machines in the possession of the Air Battalion—most of them built in France—which are in every respect inferior to the Avro and the Cody; and it passes the comprehension of the average man why they should be preferred to British productions. Had the smallest encouragement been given by the Government two years—even a year—ago these machines would have been occupying the place now held by leading French aeroplanes.

" A new Martin-Handasyde monoplane was out with Mr.



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Army Manœuvres, 1910. Bristol Biplane

Sopwith up, and this is another British production which can compare favourably with the best French work."

What was the use? With all the weight that a Ministerial statement in Parliament carries Colonel (now Major-General) F. E. Seely, in March, 1912, cast discredit upon the British aeronautical industry by saying that the War Office could not buy so many British aeroplanes as they could wish because the first essential was efficiency and safety.

The Minister was advised by a Technical Committee, but he seems to have expressed this opinion with rather tactless forcefulness. The members of that Committee were Generals Scott and Moncrieff, representing the Master-General of Ordnance; General Henderson, Commander Samson and Lieutenant Gregory, Mr. Mervyn O'Gorman (Chief of the Army Aircraft Factory) and Colonel Seely. Generals Scott and Moncrieff had little, if any, technical aeronautical knowledge. General Henderson gained his certificate on a British machine. The two naval officers had learned to fly on British machines lent to the Admiralty.

French manufacturers were amazed at Colonel Seely's indiscretion. They knew there was no truth in his charges. But in the meantime they reaped the advantage. Purchasers of machines, private or military, paused before patronising British work.

The War Office Military Aeroplane Competition was held on Salisbury Plain, in August, 1912. There was a British and an International section.

The entries were:

BIPLANES

Aeroplane	Motor	Pilot
Avro (B)	Green (B)	Lieut. W. Parke (B)
Coventry Ord. (B)	Gnome (F)	
Coventry Ord. (B)	Chenu (F)	T. O. M. Sopwith (B)
Bristol (B)	Daimler (G)	Gordon England (B)
Bristol (B)	Gnome (F)	H. Pixton (B)
Flanders (B)	A.B.C. (B)	F. P. Raynham (B)
Cody (B)	Daimler (A)	S. F. Cody (B)
Bréguet (B)	Salmson (F)	Moineau (F)
Farman (F)	Renault (F)	P. Verrier (F)

MONOPLANES

Bristol (B)	Gnome (F)	J. Valentine (B)
Bristol (B)	Gnome (F)	H. R. Busteed (B)
Aerial Wheel (B)	N.E.C. (B)	
Pigot (B)	Anzani (F)	Parr
Handley Page (B)	Gnome (F)	E. Petre (B)
Martin-Handasyde (B)	Chenu (F)	C. Gordon Bell (B)

Vickers (B)	..	Viale (F)	Macdonald (B)
Mersey (B)	..	Isaacson (B)	R. C. Fenwick (B)
Deperdussin (B)	..	Anzani (F)	Lieut. J. C. Porte (B)
Deperdussin (B)	..	Gnome (F)	M. Prévost (F)
Deperdussin (F)	..	Gnome (F)	J. Védrines (F)
Hanriot (F)	..	Gnome (F)	S. V. Sippe (B)
Hanriot (F)	..	Gnome (F)	Bielovucie (P)
Blériot (F)	..	Gnome (F)	
Blériot (F)	..	Gnome (F)	Perreyon (F)

B.—British G—German
F.—French P—Peruvian

Progress in the evolution of the aeroplane was very strikingly demonstrated in this competition: the machines, with very few exceptions, exceeded anticipations. Almost directly the trials began, a surprise was vouchsafed to those theorists who doubted whether the climbing test would be accomplished by more than a few machines, or by a big margin by any. Three monoplanes—the two Hanriots and a Duperdussin—actually climbed, notwithstanding their live load of 350lbs. and fuel sufficient for four and a half hours' flying—at a rate of 330 feet per minute. The Cody biplane took only three and a half minutes to attain 1,000 feet, a result which appeared to disappoint its pilot. One of the Blériots, driven by a 70 h.p. Gnome motor, at the first attempt very nearly climbed at the stipulated rate of 200 feet per minute, although it lost points through carrying slightly insufficient fuel. In the French trials, in 1911, none of the leading machines had less than 100 h.p., yet not one of them climbed at so much as 200 feet per minute, although they were somewhat less heavily-laden than were the aeroplanes in the British trials.

For ready transferability from road to flying trim, for interchangeableness of parts, and, in some degree, even for the standardisation of parts, the machines showed that the campaigning type of craft was in sight. In the Brêguet and the Vickers steel construction was embodied, and the Bristol and Hanriot exhibited the trend in a minor degree.

One direction in which standardisation was being manifested was in that of the controls. Nearly all the machines had control-wheels, the turning of which warped the wings, while movements forward and back actuated the elevators. Rudder control was by foot lever. An exception was provided by the Cody biplane, and also by the Maurice Farman, (the rudder of which was controlled by pedals). The virtual disappearance of the Antoinette type, and the fact that there were no American machines in the trials, removed two elements that would otherwise have made for variety of control.

Some of the machines were rendered steerable on the ground by the device of coupling the rudder lever to a steering wheel in the chassis. Several had land brakes. In the new Blériot, the Coventry Ordnance, and others, this took the form of a steel sprag, which could be released by the pilot. The Bleriot had its tail-skid placed far forward, almost immediately below the pilot, and this acted as a drag on the machine after it landed.

The authorities were convinced that the war aeroplane should have a silenced motor. Such a condition, of course, would have prevented machines from entering; and, after all, an unsilenced aeroplane is better than no aeroplane at all from the soldier's standpoint. In the conditions, however, the use of silencers was mentioned as being desirable.

Tests that were expected to prove a severe ordeal for some of the machines were those relating to landing upon and ascending from rough ground. In the French trials the Deperdussin monoplane scored heavily in this test; but the British competitions were more difficult, for the authorities intended that the selected ground should really be "heavy going".

Two interesting monoplanes were the Handley Page and the Mersey. The former was stable naturally, and it had been flown by Petre in high winds. Like all machines with a good deal of natural stability, it rolled and pitched considerably, but recovered balance without much work by the pilot. The Mersey machine was less robust in appearance than some of the older types, and it had a unique method of driving. The engine was in front—a 45 h.p. Anzani—and the propeller was placed at the rear of the main planes, and it had no fixed vertical surface. It lifted surprisingly well; but it behaved peculiarly in flight, showing a tendency to swerve from side to side as if steering were difficult.

Incredible though it may appear, this was the first occasion when aeroplane weights were accurately measured in a series. The usual published weights based upon rough estimates provided by manufacturers were unreliable; indeed, no standard for estimates had been fixed. While the trial machines were being assembled tables were compiled giving their weights from particulars supplied by the makers; but when these tables were compared with those compiled after the machines were accurately weighed in the presence of official observers on the weighbridge extraordinary discrepancies were found. It is very remarkable that no one hitherto had had correct figures as to the weights of machines upon which to base calculations. In almost an equal degree this past uncertainty applied to the stated dimensions and form of wings.

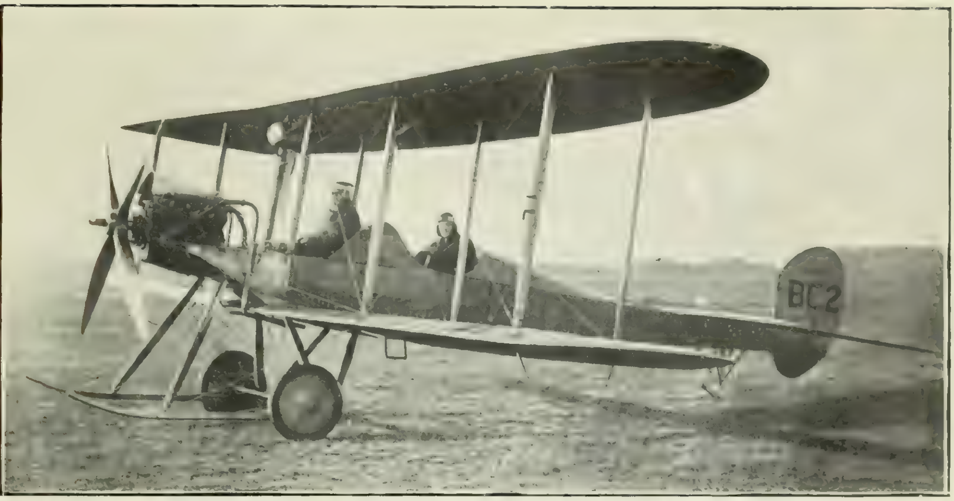
On questions of performance an even greater uncertainty existed. Speeds had seldom been accurately measured; the rate of climbing had been merely guessed at; and it had been impossible to ascertain the gliding path of an aeroplane. As to the latter, the most extraordinary diversity of opinion was possible. No great effort had been made to form a correct estimate even by the primitive method of measuring the apparent horizontal distance on the ground between the alighting point and the spot in a vertical line with the machine at the moment of cutting off the engine. The competition, however, stimulated the designing of a remarkable instrument, by which not only was the gliding path of an aeroplane measured with sufficient accuracy, but also its precise path in the vertical dimension when encountering gusts and eddies.

Machines were required to descend vol-plané on a gradient of 1 in 6. Some designers were of the opinion that such a fine glide was practically unattainable with machines so heavily laden. But absurd claims had been made as to gliding angles, and the public were misled into the belief that glides of 1 in 12 and even less were possible. Certainly the results of the gliding tests showed that the War Office were well advised when they made a glide of 1 in 6 a quality to be desired.

For the first time accurate wind-flying tests were possible, and no one could fail to be impressed by the wind-flying qualities displayed. The Martin-Handasyde monoplane was stable in a gusty wind varying between 16 and 34 miles per hour. Others were as follows: Blériot monoplane and Avro biplane (wind 28–15 m.p.h.), Bristol monoplane (wind 31–15 m.p.h.), French Deperdussin monoplane (wind 29½–13 m.p.h.), M. Farman biplane (wind 29–14 m.p.h.), Cody biplane (wind 27–14 m.p.h.). It should not be assumed that this list represents any order of merit; bigger winds could be negotiated by some of the machines; but the test had to be made at such times as were convenient.

In the important quality of speed-variation the Cody and the Farman biplanes stood high, the former with 72.4 and 48.5 miles per hour, and the latter with 55.2 and 37.4 miles per hour. The high speed of the Cody was, of course, due to its powerful engine, and its speed-range was probably a world record for a machine loaded with four and a half hours' fuel and a passenger.

The excellent quality of some of the Royal Aircraft Factory machines which were performing side by side with those in the competition was acknowledged. The "B.E. 2" was for the sake of comparison put through the same tests. It was driven by a comparatively low-powered engine. It created a British



The first B.E.2, Farnborough, 1912

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altitude record by climbing to 9,900 feet with full load. Actually in some of the tests it did better than the competing machines. This machine was very cleverly handled by Mr. G. de Havilland who was soon to become famous as a designer.

During the trials Mr. R. C. Fenwick was killed through his aeroplane collapsing in flight. I remember I had just got up into the Hanriot monoplane, in which Mr. S. V. Sippe had promised to give me a flight, when, looking across the hollow in the Downs and the wood beyond—familiar flying ground—we saw the Mersey monoplane suddenly hesitate and flutter. An instant more and the wings collapsed, and it fell out of sight beyond the trees. The pilot was killed.

The late Lieutenant Wilfred Parke in the Avro, the first "cabin" aeroplane to fly, sometimes smoked a calabash pipe whilst flying this machine. One morning when up with Lieutenant Reynolds he got into a spin and, as recorded elsewhere, averted disaster and at the same time learned a valuable lesson.

I remember seeing at the trials a remarkable aeroplane with landing wheels some five feet in diameter. This was the work of the Aerial Wheel Syndicate. It never flew.

The result of the competition was astonishing. S. F. Cody headed the list both in the International and in the British Section.

Results:

INTERNATIONAL DIVISION

First Prize.—£4,000, Cody biplane, Austro-Daimler motor.

Second Prize.—£2,000, Deperdussin monoplane.

BRITISH DIVISION

First Prize.—£1,000, Cody biplane, Austro-Daimler motor.

The Two Second Prizes were withheld.

The Three Third Prizes of £500 were awarded to the British Deperdussin monoplane (Gnome motor), and two Bristol monoplanes (Gnome motors).

Six machines were awarded £100 each, namely, two Hanriot monoplanes, two Blériot monoplanes, one Maurice Farman biplane and one Avro biplane.

Throughout the trials bad weather was experienced. Of 20 machines that assembled, only 11 made any serious effort to perform the tests. Many of the machines, particularly the British ones, were barely completed in time, and of those that were ready few had been subjected to preliminary trials. The wind-flying accomplished by many of the competitors was remarkable, one of them—a Bristol monoplane—flying in a wind of 44.17 miles an hour.

Cody went through the trials in a manner that was fascinating to watch. He was a lonely figure, unsupported, as everyone knew, by the resources of a big factory and by draughtsmen, engineers, mechanics and pilots. The table of results does not completely explain his triumph. It should be remembered that the judges took into account other matters than those summarised; they examined machines for general military suitability, and innumerable details were noted in the observers' reports, which were not published. The Cody machine undoubtedly scored not only for its high speed and for its great range of speed, but also for its strength of construction and its ability to sustain knocking about. Among its distinctive points was the landing carriage, which enabled it to take shocks which would have damaged most other machines.

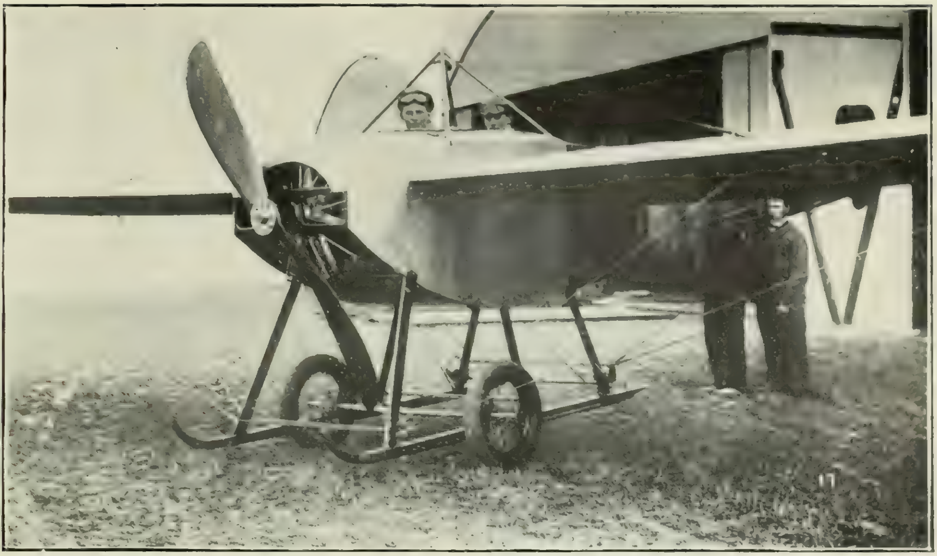
An assumption that will automatically follow from what has been said must be corrected. The Cody aeroplane was not adopted for service; in fact, only two were ordered by the Government.

There was some excuse for withholding some of the prize money. At the same time, in doing so the authorities missed an opportunity of giving encouragement to the British trade. The money had been set aside for the competition, and it is difficult to see that any credit for economy could accrue to the judges for saving a paltry £2,000. Even if all the money had been spent it would appear very little as compared with that given in the French trials, all of which, moreover, went to the national industry.

It was gratifying to see the good showing made by British aeroplanes, generally, as against their foreign rivals, and it was a surprise to critics who had been decrying British work to find that not only was a British biplane the first prize-winner, but that a British monoplane compared extremely favourably with the French.

In the biplane class the Avro had little to fear by comparison with any other. The table of results is unfair to the Avro in one respect—its climb is given as 9 mins. 30 secs. for the first 1,000 feet. Apparently it struck a bad patch, for the second 1,000 feet was climbed in less than three minutes. The glide of this machine was remarkably good, being 1 in 6.5. Its range, or radius of action, was second only to that of the Cody. It carried petrol for six hours' flying.

But theorists had to confess that in some degree they had been confounded by the trials of the machines assembled on



Hanriot Monoplane. War Office Competition, 1912

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Lark Hill. Less than a week before the competition began more than one expressed doubts whether the climbing ordeal would be undergone by any aeroplane in view of the big load stipulated. Yet of the first five machines that essayed the test three actually climbed at the rate of 330 feet per minute and one at just short of 300 feet per minute.

Here are a few of the knotty problems discussed during the Trials in connection with the gliding angle:

"Is a greater horizontal distance traversed when the machine is making a true glide—that is, with the tail following in the path of the head towards the place where the machine will land—or is a better result obtained when the machine descends as some can (the Farman, for example) on a nearly level keel?

"Does a machine have as good a gliding path when heavily laden?

"Is it advantageous, in order to secure the longest possible glide as regards distance, to descend rapidly—that is, in the position in which head resistance is least—or slowly?"

(I quote these questions in order to convey an idea of the flying theories at that time discussed).

The trials were the occasion of a great gathering of aeronautical experts and enthusiasts. Long and heated were some of the discussions at the end of the day. One well-known flyer triumphantly demonstrated that the vertical struts of his machine were actually so shaped that their head-resistance was negative! He assumed an injured air when someone asked him why he did not fix 500 vertical struts to his machine—and fly without an engine!

A mathematician was decoyed into a heated argument on the question whether the centre of pressure ought not to be *in front* of the leading edge of the wings! He was cornered into admitting that it would be a great advantage; and he was left pondering deeply.

Recalling some of the personalities at the Military trials, the name of Brig.-General David Henderson comes first. After only a week's instruction he took his flying certificate at the British School at Brooklands, doing this whilst on sick leave in August, 1911. He directed the competition, but I forget under what title.

When he learned to fly he was fifty years of age. He had entered the army in 1883 and served in the Soudan, and in the South African war with distinction on General French's staff. He was wounded badly in South Africa. Reconnaissance was one of his studies, and it was partly for this reason that the air appealed to him. He wrote a book, *The*

Art of Reconnaissance, which made its mark. In July, 1913, he was appointed Director-General of the Air Department at the War Office. Notwithstanding the fact that General Henderson, through his association with Government aviation, came in for criticism on that account, he was universally liked and respected.

During the Military Trials his second was Major (now Major-General Sir) F. H. Sykes. I remember a chilly morning when Major Sykes went up with Mr. G. de Havilland on a B.E.2. They made a world altitude record (with passenger). He learned to fly in 1911, taking his ticket—No. 95—on a Bristol biplane on June 20. He was not in the Air Battalion, as it was then called, and his appointment to the first command of the Military Wing of the Royal Flying Corps came as a surprise to many people. He had had a distinguished career in the service, and he had done important work in India, and he helped to draw up the original organisation of the R.F.C. He served in the Imperial Yeomanry in the South African War, and was in the Commander-in-Chief's entourage. On November 22, 1913, he was with Captain Longcroft on the flight from Montrose to Portsmouth and back to Farnborough. At the outbreak of the war with Germany he went out to France as Chief Staff Officer of the Royal Flying Corps squadrons which accompanied the Expeditionary Force.

The Royal Flying Corps had been constituted by a Royal Warrant in April, 1912, Colonel Seely announcing there would be required for the Military Wing 133 officers, and for the Naval Wing about 30 or 40 officers. Non-commissioned officers were also trained to fly.

Captain G. H. Raleigh, Capt. C. A. H. (now Air-Commodore) Longcroft are among the names I recall from that period; and, of course, Major H. M. Trenchard, of whom, however, not a great deal was heard much before 1913; that is to say, in the flying world.

Major (now Marshal of the Air Force, Sir) Hugh Trenchard had failed in examinations for the Army, which he entered by way of a militia battalion of the Royal Scots Fusiliers. He saw a great deal of foreign service in India and Africa, in the South African War, and in the West African Frontier Force. He was wounded, and received the D.S.O. and almost innumerable mentions. He learned to fly early in 1912, and Mr. T. O. M. Sopwith is quoted in the *Official History of the War* as follows:

" Major Trenchard arrived at my school at Brooklands one morning in August, 1912. He told me the War Office had given him ten days in which to learn to fly and pass his tests for an aviator's certificate, adding that if he could not pass by that date he would be over age. It was no easy performance, but Major Trenchard tackled it with a wonderful spirit. He was out at dawn every morning, and only too keen to do anything to expedite tuition. He passed in about a week. He was a model pupil, from whom many younger men should have taken a lead."

He took his ticket in that month, and received the 270th certificate issued by the Royal Aero Club. Then he went to the Central Flying School, and passed all tests and examinations, and in October was appointed instructor on the staff. Many officers passed through his hands, and to his energies in large measure was due the efficiency of the Royal Flying Corps.

The two earliest squadrons of the R.F.C. were under Major Brooke-Popham and Major Burke. Captain Francis F. Waldron was one of our best army flyers. He took part in the flight from Farnborough to Montrose in 1913, and was the first of the four who started, in what was an adventurous journey for those days, to reach the destination. He made many big flights on duty.

Major (now Air-Vice Marshal) Sir John Higgins was another flyer of the Army Flying Corps. He had a narrow escape in May, 1913, Flying at Farnborough his engine failed, and he came down intending to land in the recreation ground. He saw children. To avoid them he made another circle, missed a large building by inches only, passed over a busy street, cutting through telegraph wires, and finally landed safely in a flooded meadow.

Then there was the late Capt. Henry Fawcett, of the R.M.L.I., who on December 2, 1913, was a passenger with Captain G. V. Wildman-Lushington when he was killed in an aeroplane (M. Farman) accident at Eastchurch. Captain Fawcett sustained a broken collar-bone. For a few weeks during the war I was at an aerodrome at which Fawcett was C.O.

In 1913, the authorities were again criticised for the lack of support given to the aircraft industry. At the Royal Aircraft Factory aeroplanes were designed and, although over and over again the Government declared that only experimental types were to be built at the factory, and that it in no way encroached on the aircraft industry, little trust was placed in this assurance. Small orders were occasionally given to British firms, but only in response to agitation in Parliament and the Press. General Henderson, who could have left the defence to the Parliamentary representative of the Government Department concerned, made a protest at a meeting of the Aeronautical Society, claiming that the reason for the lack of orders was lack of money. Colonel Seely had expressly denied that Treasury parsimony was to blame, and had stated that he accepted full responsibility.

Unfortunately the criticisms of the Government had in some quarters taken the form of attacks on General Henderson, and from such attacks I disassociated myself (Articles in *The Observer*, November 3, 1912, and March 30, 1913).

It was impossible to approve of the system by which aeroplanes were sent to the Royal Aircraft Factory for repair and renewal; in this case it was handing over machines to the tender mercies of a concern which was in some measure a competitor.

Colonel Seely had referred to a Royal Aircraft Factory design as " the best machine in the world ", a statement he would have had great difficulty in supporting, and one in any case, unjustifiably belittling the productions of private firms seeking foreign markets.

Then came Colonel Seely's assertion that the Army possessed 101 aeroplanes, a statement promptly challenged by Lord Montagu of Beaulieu. The Secretary of State for War invited Lord Montagu to investigate the particulars of the War Office list, and as a result Lord Montagu admitted that Colonel Seely's statement was accurate, and fully borne out by the evidence shown him in confidence.

The Minister's victory, however, was of the Pyrrhic kind. Lord Montagu had couched his challenge in terms easily answered. At that time there were fewer than 50 machines that could be regarded as of any practical use for other than school purposes. The total of 101 had been made up of anything and everything that could, by any stretch of courtesy, be called a military aeroplane, the inclusion of derelict and banned machines, and so on. Later the number of machines grew to " 120 ", and then Mr. (now Sir) William Joynson Hicks asked to see them. I find the following note:

"Mr. Joynson Hicks has been permitted to make known the result of his review of War Office aeroplanes. He challenged Colonel Seely to let him see them, and the War Secretary could not very well ignore the challenge; he had Mr. Joynson Hick's promise of a handsome apology if he could substantiate his claim that there were 120 aeroplanes in the possession of the War Office at the beginning of June, for the question had drifted on from the time of the Army Estimates speech, when Colonel Seely claimed 101, together with ' the best aeroplane in the world ', and the result was that before Mr. Joynson Hicks, accompanied by Mr. Sandys, M.P., went round to the flying centres they were provided with a statement by the War Office showing that the 120 machines were made up as follows:

43 ready to fly.
7 under test.
24 under repair.
9 total wrecks.
3 experimental ready to fly.
9 under reconstruction.
25 monoplanes.

" Of those ready to fly, 20 were at the Central Flying School used for teaching and, therefore, especially liable to damage. Of the monoplanes only two were in the flying list." These figures confirmed the statements I had made in articles on the subject.

Since the war a claim to the effect that it was possible to stop the engine of an aeroplane by means of wireless interruption of the magneto, made a nine days' wonder. In 1913 the War Office was hoaxed by a "discovery" of this kind. Some time early in May, the War Office received a communication from an inventor who stated that he was able by means of a wireless apparatus to stop the engine of any aeroplane in flight and thereby cause it to come to earth for lack of propelling power. His case was that in the event of an enemy sending aeroplanes over warships or forts his apparatus could prevent their operations, rob them of the power of flying away, and cause them to descend and thus fall into the hands of our defending forces. The War Office jumped at the idea, and after some correspondence, it is stated, offered the inventor the opportunity of experimenting on an Army aeroplane at Salisbury. If he could force one of the Army aeroplanes to plane down, the engine having been stopped by the wireless apparatus, the War Office would consider the invention with a view to purchase.

The inventor was invited to go to Salisbury, but all the efforts of the War Office to come into personal touch with him seemed fruitless. He, however, is stated to have written that he accepted the offer; that he was sending on his secret apparatus; and that he would follow it. The apparatus arrived, but Mr. Gray failed to turn up. When the box was opened it was found to contain sand.

Colonel Seely may have referred to this invention in his speech on the Army Estimates, in the course of which he referred to a revolutionary invention which had been brought to the attention of the War Office, and to the striking advantage it would give Great Britain over the air fleets of foreign Powers!

It is often forgotten that the separate air service was fore-shadowed before the Great War. A separate Air Ministry would, however, in those days scarcely have been justified. The War taught the need for it; although there may yet be changes, the separate department studying and controlling all forms of air activity must, and will, remain.

A Government scheme for the organisation of the Third Arm laid down the principle that Navy aviators should, in case of need, be called upon to assist in marine warfare. That was a serious flaw, for the functions of Army and Navy airmen are different, and each division requires such constant and elaborate specialised training that it is not possible for one man to combine the two sets of qualifications. Perhaps the weakest feature was the fact that many officers and men of the Royal Flying Corps would not have to perform continuous service, but would merely be required to incur an obligation, and would be retained on condition that they kept themselves proficient. Aviation and aeronautical mechanics take up a man's undivided attention; they cannot be taken in any casual way, and soldiers or sailors expected to keep on with their duties in other branches of the Services would certainly fail to be really efficient in aviation.

On May 7, 1927, Air-Marshal Sir John M. Salmond unveiled at Cambridge a memorial to three distinguished Cambridge scientists, Bertram Hopkinson, Keith Lucas, and Edward Busk, who lost their lives flying during the war. The memorial was erected in the lecture hall of the Cambridge University Air Squadron by members of the Squadron and friends of those commemorated. The inscription, after reciting the three names honoured, continues:—*Hujus Academiae alumnorum ob rerum naturae scientiam insignium qui arti aeris navigandi operam stadium vitam ipsam impenderunt* (. . . graduates of this University, distinguished students of natural science, who gave diligence, devotion, and life itself to the study of aeronautics).

The memorial takes the form of an oak panel from the designs of Mr. George Hubbard, F.S.A.

Lieutenant-Colonel Hopkinson, C.M.G., was Professor of Engineering in the University. He greatly developed the School of Engineering, and formed an engineering branch of the C.U.O.T.C. After various appointments during the early part of the war, he became Deputy-Controller of the Technical Department at the head-quarters of the Air Ministry. Although 40 years of age, he considered it his duty to learn to fly, and it was flying from Martlesham Heath to London that he crashed and was instantly killed.

Dr. Keith Lucas's marvellous skill in designing instruments had enabled him to reduce one side of physiology to an exact science. He became a fellow of Trinity in 1909. When he was on the staff of the Aircraft Factory at Farnborough, during the war, a long series of experiments conducted by him revealed the source of various errors in aeroplane compasses, and he was successful in inducing numerous improvements into their design. He was killed in a collision in the air.

E. T. Busk had been appointed Assistant Engineer Physicist at Farnborough in 1912. He was one of the earliest victims of the war, being killed by an outbreak of fire in the air on November 5, 1914. He had especially applied himself to the theory of stability, and was able to demonstrate that minor modifications only were needed to make any aeroplane stable. For this he was awarded, after death, the Gold Medal of the Royal Aeronautical Society. But his great claim to fame lay in the tradition which he started of the performance of accurate and scientifically conceived experiments in the difficult conditions of free flight.

A brilliant young Cambridge man (King's College) Busk joined the Royal Aircraft Factory in 1912, having already spent some time at the National Physical Laboratory. He understood the theory of flight, and he was a daring pilot. In collaboration with Mr. Bairstow, he worked at the problems of stability. Practically testing stability he would deliberately put a machine out of balance at a great height and observe its recovery. He flew in violent winds, and in order to analyse the amount of control required from the pilot he used an instrument called the Ripograph, his own invention, which recorded all the pilot's operations. The series of B.E. and R.E. machines, in all of which inherent stability was a marked feature, were largely due to him.

In 1914 the War Office offered to test aeroplanes of private design with a view to their suitability for military purposes. Strange to say the offer omitted reference to equipment or facilities for bomb-dropping, and gave importance to facilities for carrying a gun. In this respect the War Office had come to a quite different conclusion from the military authorities of France and Germany, who attached more and more importance to bomb-dropping.

Aero engines for a War Office competition were accepted in April, 1914, but I have no record of the result. Possibly the outbreak of war interfered.

As the shadow of that calamity approached, seen by so few, the War Office issued specifications for various military types, and it is interesting now to examine the requirements.

PERFORMANCES REQUIRED FROM VARIOUS MILITARY TYPES

	LIGHT SCOUT	RECONNAISSANCE AEROPLANE (*a*)	RECONNAISSANCE AEROPLANE (*b*)	FIGHTING AEROPLANE (*a*)	FIGHTING AEROPLANE (*b*)
Tankage	300 miles	300 miles	200 miles	200 miles	300 miles
To carry Pilot only		Pilot and observer plus 80 lbs. for wireless equipment	Pilot and observer plus 80 lbs. for wireless equipment	Pilot and gunner plus 300 lbs. for gun and ammunition	Pilot and gunner plus 100 lbs.
Range of speed . .	50 to 85 miles per hour	45 to 75 miles per hour	35 to 60 miles per hour	45 to 65 miles per hour	45 to 75 miles per hour
To climb 3,500 feet in	5 minutes	7 minutes	10 minutes	10 minutes	8 minutes
Miscellaneous qualities	Capable of being started by the pilot single-handed		To land over a 30-feet vertical obstacle and pull up within a distance of 100 yards from that obstacle, the wind not being more than 15 miles per hour. A very good view essential	A clear field of fire in every direction up to 30 degrees from the line of flight	A clear field of fire in every direction up to 30 degrees from the line of flight

Instructional aeroplanes with an endurance of 150 miles were also tested under special conditions ; safety and ease of landing being required in this type.

Government and Flying

About seventy aeroplanes and over 600 officers and men of the Royal Flying Corps encamped on Salisbury Plain, in June, 1914. This was a mobilisation of Nos. 2, 3, 4, 5, and 6 Squadrons. Squadron 2 travelled from Montrose to Netheravon accompanied by complete motor road transport of twenty-four vehicles, besides officers' cars. There were twelve officers, two warrant officers, and 129 N.C.O.'s. and men. Its strength was unhappily depleted by accidents; nevertheless, of all the squadrons in camp it was the most complete. Squadrons 3 and 4 were permanently stationed at Netheravon. Squadrons 5 and 6 travelled by air from Farnborough. Together they comprised 48 officers and 330 rank and file.

If the full paper strength of the Royal Flying Corps had been realised the assembly of five squadrons would have brought together 125 aeroplanes, about 125 motor vehicles, and 1,100 officers and men.

The camp was under the command of Lieut.-Colonel F. H. Sykes, but the general director of the manœuvres was Brig.-General Henderson. These manœuvres were of an exceedingly practical character, and land troops co-operated. The Navy airships, Nos. 3 and 4, took part.

A great variety of machines were assembled at Netheravon, the bulk of them being B. E. and Farman biplanes; but there were one or two Sopwith biplanes, Blériot monoplanes, an R. E. biplane, and other craft.

Among the personnel were Lieut. G. F. Pretyman, the Hon. M. Baring, Captain Joubert de la Ferte. But the reader will find a list of the officers of the squadrons which flew to France in the official history of the War in the Air by Sir Walter Raleigh.

The Great War came, and it put an end to a period. Most of us changed our occupation and became absorbed in new duties. Certain critics of the Government's air policy, and especially of the Aircraft Factory at Farnborough, which it was alleged was responsible for any shortcomings of our Air Service equipment, went so far in the Press and in Parliament that an inquiry was held. Some of the more sweeping charges that had been made could not be supported at that Inquiry, but in all probability no great harm was done by thrashing some of these matters out in public.

CHAPTER XXIII

EARLY EXHIBITIONS

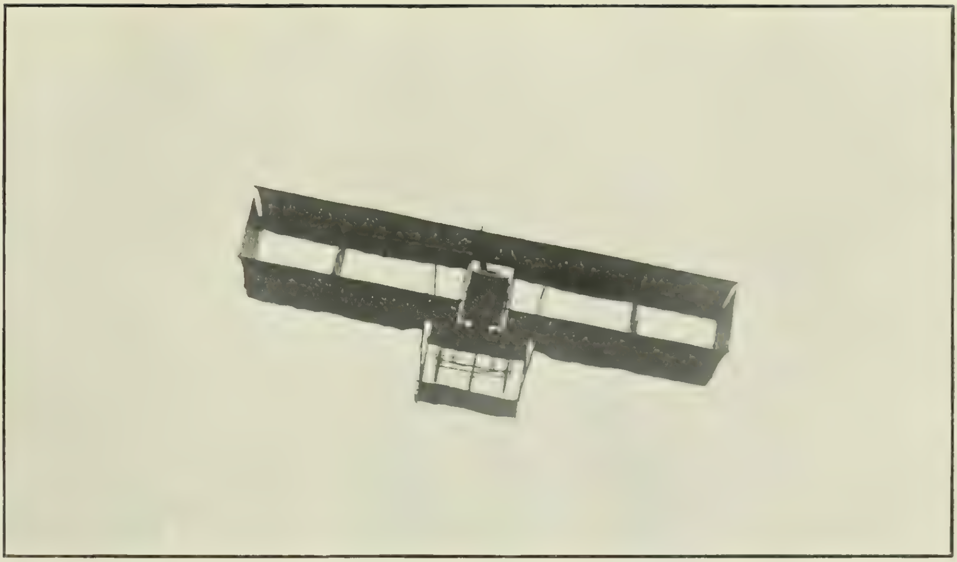
"SALON of the Air—France celebrates the New Era—Britain's Extraordinary Apathy—100 Frenchmen who can fly." These were the headlines of an article I wrote in a daily newspaper on December 28, 1908. It described the Exhibition at the Grand Palais des Champs Elysées, the first one of its kind; and I can never understand why that great historic collection of the first practicable flying machines is no longer counted as one of the series. Regarding the 1908 exhibition as the first, as it certainly was, that of 1926 was not the "tenth," as it was called on the catalogue, but the "eleventh". The organisers, however, chose to call the 1909 Exhibition the first, and the only possible reason was that the 1908 Show was not entirely one for aeronautics.

I went there from Antwerp, after giving a lecture on the Sweden and Russia balloon voyages, and found the Aero Show the centre of attraction, thronged every day by French citizens of both sexes and all classes. The French nation had risen to the occasion, and had seen the vision of the age of flight. There I met men who were being talked about, and who have since become world famous: M. Louis Blériot, who was, in a few months, to fly across the English Channel, M. Henri Farman, Léon Delagrange, Levasseur, Esnault-Pelterie, the Voisins, and a dozen others.

But I could not find Wilbur Wright. He was to have been there; and he had actually arrived on the scenes on the day before the exhibition opened. Then he disappeared with his machine, and rumour got busy; for example, that attempts had been made to damage it. He had certainly taken it away. However, he brought it back.

The new airship, "Ville de Bordeaux" was slung in the centre of the vast hall, carrying two mitrailleuses in its aluminium car. Also there were spherical balloons, and a vast number of models of all types. But the full-size aeroplanes were the principal attraction.

Among these, occupying pride of place, for France was eager to claim priority over America in the first achievement of flying,



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H. Farman Biplane, 1908

was the "Avion" of Clement Ader, flown, it was claimed, fifteen years before and driven by a steam motor. At this time Ader was an embittered man, for the French Government had till then refused to recognise his flight, although it seems he actually did make a short hop on that extraordinary apparatus.

One of the most interesting machines was the Bréguet-Richet, which had two propellers driven by a 50 h.p. Antoinette motor. The propellers were of aluminium, and the frame of the aeroplane was of steel tubing. Thus early did M. Bréguet adopt metal construction. This machine had achieved a flight of one kilometre at Douai.

The new Blériot aeroplane was a biplane, although M. Blériot told me he had not lost faith in the monoplane. His biplane had a triple rudder in front, but the elevator plane was at the rear. Two vertical panels between the planes, a feature which in those days was embodied in most of the biplanes of the French school, were used for radiator surfaces for the 50 h.p. engine. The vertical panels were designed to prevent excessive rolling, but M. Blériot had an additional stability contrivance, a weight attached to the control surfaces and automatically causing them to correct the tilting up of the wings at turns, that perfectly natural behaviour of a flying machine which in those days was regarded with suspicion and uneasiness! The machine was a four-seater!

The Farman and Delagrange biplanes, in which many flights had been made, were very much like each other: pushers, with vertical panels. Each was driven by a 50 h.p. Antoinette motor. Each had front elevators and a heavy, cumbersome tail. The Esnault-Pelterie machine was a monoplane of which the movable wing tips was a novel feature for those days. There were many engines, the French aiming at lightness, whereas the Wright Brothers decided that extreme lightness might be secured at too great a sacrifice of reliability. The principal motors were the Antoinette, the R.E.P. and the Farcot. Control systems had not been standardised, and there were as many different kinds as there were aeroplanes.

One noticeable contrast between the French and the American schools was the difference between the lateral control systems. The Wright Brothers made the extremities of their wings flexible, or warpable, whereas the French machines, monoplane and biplane alike, had ailerons of one form or another; and, as we have seen, in the case of the Blériot biplane these were automatically worked, at any rate to some extent. Generally speaking, French construction showed better finish than that of the Wright machine.

A model of the Santos Dumont "parasol" monoplane, which was to develop to the machine flown at the Bournemouth meeting in 1910, was seen at this Salon.

At this time, by the way, Mr. Moore-Brabazon owned a Voisin biplane, a type with no fewer than five vertical side panels. It looked more like a huge crate than a flying machine.

Another Aero Show was to be held at the Grand Palais in the autumn of 1909, but before that there was to be the great international aeronautical exhibition at Frankfort, which opened in July, whilst an Aero Show was held at Olympia, London, in the spring, and a Travel, Sports, and Pastimes Exhibition, which included an aeronautical section, was also held at Olympia, in July, 1909.

A Model Exhibition had been held at the Agricultural Hall, Islington, in 1907, and Mr. A. V. Roe, Mr. T. W. K. Clarke, José Weiss, Major Baden-Powell, Mr. W. Cochrane, Mr. R. M. Balston, and Mr. H. Piffard were among the exhibitors.

The International Aero Show at Olympia in March, 1909, was organised by the Society of Motor Manufacturers and Traders, and it comprised motor boats as well as aircraft. I shall always recall it as a sort of nightmare of freaks. One machine, the Lamplough, looked more like a scenic railway than an aeroplane; it was an edifice (that is the only word) of an immense number of wooden girders, lattices, floors and venetian blinds. Then there was the machine of Mr. Jack Humphreys, described in the catalogue as follows:

" A biplane of new design, having a boat body and side-floats of hydroplane type. It is intended that the machine shall be capable of arising from and alighting on both water and land. The wheels are fixed at the ends of bamboos, thus obtaining the natural spring thereof, the whole being capable of being lifted so as to be clear when a descent upon water is made. In addition to the main planes, there is an elevator in front, two side wings and a tail. These all have new features, and are capable of controlling the machine under all conditions. The engine is an 8-cylinder J.A.P. mounted on a chassis across the frame; and two 8-feet propellers are driven through bevel gears. The propellers run at 400 revolutions and are of new design, made of steel throughout; clutch fly-wheels are interposed. Half-a-mile has been covered on a glider of simple design, but involving the same principles."

At that time Mr. Jack Humphreys was the hero of strange rumours. It was said that he had carried out secret gliding experiments at a lonely part of the Cornish coast, and that he had scared the local fishermen out of their wits. It was said they told tales of a strange aerial monster soaring over their fleets on moonlit nights, silent as a bat or an owl. Whether they had actually seen this, or whether it was pure imagination I never discovered.

The Bréguet machine seems to have been part aeroplane and part helicopter. But there were Delagrange and R.E.P. machines, and Mr. Moore-Brabazon's Voisin. Short Brothers showed balloons. Mr. Howard Wright exhibited the biplane built for Mr. Seton-Karr.

The Aero Club had exhibits of models, and Mr. Handley Page showed the Deverall Saul quadruplane (which never came to anything, I believe) and the Weiss monoplane, here described.

" The design of this aeroplane is based upon the experience obtained with numbers of models acting as gliders and also fitted with engines and propellers, and driven under power. They are shaped somewhat after the lines of a bird, but have no tail, as this is not necessary for gliding or flying, only being required for turning movements. The rear edge is made flexible, and is fitted with two flaps for steering the machine in a horizontal direction. The double curve of the tips gives automatic stability to the flyer.

" The machine has a total weight of 500 lbs., including the pilot, and is fitted with a 12 h.p. motor. This motor drives, through chain-gearing propellers, one fixed on either side of the body. The gearing reduces the speed in the ratio of 3 to 1. The chain wheels are directly mounted on the propeller hubs. Steering is carried out by the manipulation of the two flaps situated at the back of the main plane. The carriage on which the aeroplane is mounted is of somewhat novel design. The arrangement is such that the machine is automatically brought into the teeth of the wind. In ordinary circumstances the frame rests on three wheels, two forward and one aft. If the wind blowing sideways lifts one edge of the machine the spring on which the wheel that side is mounted presses down and moves the wheel slightly back. The wheel on the other side is moved forward, and the machine in moving forward turns to the side from which the wind is blowing. The span is 34 feet and the wing area 150 square feet."

There were numerous aero engines and accessories, nearly all of them now defunct. The list is Antoinette, Clément Talbot, Dutheil Chalmers, E. N. V., Gnome, Green, Gobron, Itala, J.A.P., Metallurgique, Miesse, E. N. C., Pipe, Renault, R.E.P., Wolseley.

The advertisements in the catalogue of the exhibition make interesting reading to-day. " Aeroplanes at reasonable prices," was the burden of their song. Mr. T. W. K. Clarke advertised gliders from £40, and aeroplanes from £480.

" Colonel " Cody, of course, was there with his man-lifting kite.

Dominating all, stood the Wellman airship " America ", 184 feet in length, and inflated with 300,000 cubic feet of air. The visitor could inspect the car of the airship, designed to carry three explorers, a pack of dogs, two sledges, a boat, and a great store of miscellaneous equipment. The car was 125 feet long, and was occupied throughout its length by the petrol tank which carried two tons of fuel. Small planes to which " feathering " motion was given were to lift the machine off the ground, then the driving propellers came into action

The Bréguet aeroplane was peculiar in that it had no elevating plane, the main planes being inclinable. There was an automatic wing-warping apparatus, by which the planes were bent differentially to counteract the varying pressure of side and front winds. This machine's wings could be folded back.

On the Miesse Car Syndicate's stand was to be seen the remarkable orthopter machine of M. Adhemar de la Hault, the famous Belgian aeronaut. The vital part of the invention consisted of the method by which the ordinary rotary motion imparted to the wings by the engine was transformed into a rapid flapping and "feathered" action. M. de la Hault had actually lifted himself in the air over 30 feet with the apparatus.

The Wright machine at this Show was offered at £1,400. Its motor developed something between 24 h.p. and 27 h.p. In many of the French flying machines motors of greater power and cost were used, yet the total cost of such machines was less than that asked for the Wright machine.

Another flying machine at Olympia was the de Pischoff and Koechlin, the makers of which offered to supply any type of aeroplane for a price not exceeding £600.

As to airships, Count Henri de la Vaulx at that period had a "tourer" of a cubic capacity of less than 30,000 cubic feet and driven by a motor of 16 h.p. The cost of such a balloon was from £1,200 to £2,000.

The history of aeronautics was illustrated by drawings and objects of great interest. Here was the actual gliding apparatus in an experiment with which Pilcher, in 1899, lost his life at Rubgy; and the gliding contrivance used by Otto Lilienthal was also exhibited.

Mons. H. J. B. Passat was to be seen daily illustrating what he believed to be the secret of flight by means of two huge bird wings, which he flapped about, ridiculed by the irreverent. Later he made a large model with a bird-shaped body and two pairs of wings for flapping-wing flight, and he claimed he could lift his own weight with this contrivance.

There, too, was Mr. A. V. Roe's triplane which, with a very low-power engine, had carried its designer several times on short flights.

Mr. J. R. Porter's direct-lift machine attracted attention. In this a revolving fan placed in the centre was to drive the air between two ring surfaces—a kind of hoop biplane—which was designed to be lifted in this fashion. A model semi-rigid airship 40 feet in length, designed by Major Baden-Powell, and somewhat resembling the "Patrie", was there, and Major Baden-Powell also showed his invention of a clockwork aeronautical camera taking pictures at regular intervals, each picture recording, not only the landscape, but the altitude of the aircraft, the direction of its flight, and other data. Mr. W. F. Howard, Mr. W. Barton, and Mr. C. Brogden were among the exhibitors of notable models.

The Frankfort Show of 1909 was of exceptional interest on account of the concentration by Germany on airships rather than aeroplanes. It was open from July 20 to October 10. There one could obtain ascents in the German kite balloon, and could see German airships in flight. From that time I lost no opportunity of directing attention to the kite balloon, and of urging our War Office to adopt it. All in vain. But directly the Great War began there was a "panic" for kite balloons. At a date after I had ended my visit the firm of Euler Brothers were offering fights on a biplane. The Frankfort Show had the advantage of great space, comprising grounds large enough for an aerodrome and for balloon ascents; and the Germans set out with characteristic thoroughness to impress themselves and the world at large. The Exhibition was beyond praise. The catalogue was a most interesting book of 280 pages.

At that time Frankfort had no particular love for the Kaiser, who was regarded as a little too headstrong, or according to some, headweak. A vine grower I met there took the latter view, but considered it was a very serious matter, and that the monarch would embroil his country in war sooner or later. But if the people of Frankfort had but little affection for the Kaiser they did not spare it where the great Zeppelin was concerned. The German people had just subscribed about £300,000 to enable Zeppelin to carry on his experiments, and the popular enthusiasm was boundless. There was not a shop window that did not display the familiar features of the inventor, stamped, embossed, carved, or printed, either on some useful article or as an ornament, a mascot, scarf pin, brooch, or hat pin. One very popular print was the portrait of Zeppelin made up of hundreds of airships, a most ingenious bit of work. It was difficult to buy a pocket handkerchief without a Zeppelin airship, or the familiar portrait, either in the corner of it or spread all over it. I saw pillowslips with a crocheted portrait of Zeppelin on them. Altogether it was rather maddening.

A Parseval airship was to have arrived at Frankfort, but it could not fly there on account of bad weather; and it was brought by rail, to be inflated in the grounds. I do not remember whether it was actually inflated. But there was a Clouth airship; and a Zeppelin often appeared in the sky. For five marks one got an ascent in the kite balloon, and had a fine view of the country. A daily newspaper called the *ILA* (Internationale Luftschiffahrt Austellung) was published in the Exhibition; and there was only one subject of conversation.

Germany had pinned her faith to airships rather than aeroplanes, but when news came of Blériot's flight across the Channel a little monument to Lilienthal, which had until then occupied a rather obscure place, was moved to a central position, and an inscription was attached to it claiming for Germany the first important gliding experiments.

The crowd was truly international; but the German military element was in great force, often in uniform. The only British exhibitor was Mr. Handley Page; but the British monthly journal *Aeronautics* was on sale.

There were ten firms showing models of airship hangers, one of them a dock revolving so that an airship could be brought in no matter what the direction of the wind; another, an extravagant affair, was star-shaped, with entries from six quarters of the compass.

A whole section was given over to aircraft and anti-aircraft armament, with many high-angle guns of Krupps and Ehrhardt. There was special anti-airship ammunition, flaring shells which would ignite the gas. Great Britain scarcely at that time believed either in airships or in aeroplanes; and here was Germany in a very fever of enthusiasm thinking out all the problems of air attack and defence!

There were deeply interesting meteorological and physiological departments, and sections dealing with bird and insect flight, navigation, instruments, motors, even toys.

In aeroplanes there was little of note, and much evidence of dependence upon foreign designs and ideas.

The second exhibition at Paris was held from September 25 to October 17, 1909. It was opened by the President of the Republic, and the whole of the French Cabinet were included in the list of patrons. Many of the machines shown the previous year were present, but this was almost entirely an aeronautical show. I wrote at the time as follows:

"The public are growing just a little tired of gazing at flying machines in exhibitions. They want to see them in flight. The general view of the Grand Palais from the great gallery, however, is magnificent. One gazes across a vast expanse covered with weird bird-like shapes, with here and there a globular or an elongated balloon. One or two exhibits in the gallery call for special remark. There is, for instance, the most beautiful collection of aeronautical pictures and balloon photographs ever brought together. Of extraordinary interest, too, are Leonardo da Vinci's MS. and sketches, and the great artist's famous treatise on aeronautics, in which the principles of winged flight, and of the parachute, are laid down. Carefully guarded by a glass case are numerous articles of furniture and art belonging to M. Paul Tissandier, and dating from the period of Louis XVI. These all have designs or decoration of an aeronautical nature, balloons and quaint flying machines being carved or painted upon them. In one gallery is the Physiological Section, which shows the effect of high altitude upon the organs of the body. There is, too, a very fine Natural Flight section, in which, by means of stuffed specimens and pictures, the design and anatomy of birds' wings are exhibited."

One of the sensations of the exhibition was the Santos Dumont monoplane, a "bird-cage parasol"! The famous Brazilian inventor had recently made a flight on it, and he now announced that the whole world was free to copy his design, although he preferred that it should be constructed by the firm of Clement Bayard. The machine could be made for £200. This remarkable aeroplane actually held the world record for take-off: it "unstuck" with a run of 70 metres in 6⅕ seconds. Its very small wing had a big camber, increasing lift at the expense of resistance. The pilot sat in a kind of cage formed by the bracing wires from wing to fuselage. The machine weighed only 240 lbs. It was copied by various people, and was flown, as elsewhere recorded, at the Bournemouth meeting of the following year. Most unstable, and offering excessive head resistance when the engine was stopped, it was necessary for it to assume a very steep gliding angle, which, however, it was very reluctant to do. I believe only two pilots ever succeeded in gliding it down. On the other hand, to the best of my belief it never killed anybody, and in the frequent crashes which befell it the pilot never sustained anything worse than a bruise or a cut or two.

At these early exhibitions there was no uniformity as to control systems. The R.E.P. monoplane was steered in the vertical dimension, not by elevators, but by warping the wing itself. The Blériot control consisted of a small steering wheel mounted on a universally jointed pillar which had a dome-shaped piece of metal at the base. To the edges of this dome the control wires were attached, so that when the pillar was moved diagonally instead of sideways, the elevator and warping wing tips were operated together. The Koechlin monoplane had a flexible elevator instead of a hinged control surface. The Gregoire Gyp monoplane had flexible wing tips operated either alternately for lateral balance, or in unison for elevation, both being controllable by one wheel.

The graceful form of many of the monoplanes was noticeable, particularly the Antoinette and the Koechlin. There were few new biplanes. The Fernandez biplane seemed to combine Wright, Curtiss, and Farman practice, and, like the Curtiss machine, was quite a small one. It had rear extension flaps, the angle of incidence of which could be varied by the pilot. There was only one forward elevating plane, set relatively near to the main ones and supplemented by a companion one aft. The driver's hands were placed on a sort of cross-bow lever.

A somewhat eccentric type was the De Dion multiplane, which reminded one of the Wright machine as regards the position and attachment of the rudders. The ten planes were placed five on each side, so that in side section the machine appeared as a quintuplane. In front view the machine was V-shaped, the two series of five planes sloping upwards from the centre, and the motor being situated in the centre and below the bottom pair of planes. The span of this machine was 40 feet; surface about 600 square feet. Its engine of 100 h.p. drove four propellers.

In the airship section considerable interest was taken in the Spiess rigid, of which a model was shown. The time came when the French referred to Spiess's early work as proof that the big rigid airship was of French, not German, design.

In March, 1910, Olympia opened to another Aero Show and this marked a big advance in British flying. There were several British aeroplanes which had made, or were about to make, flights, but whose names are now almost forgotten. Among these were Mr. Charles Lane's monoplane, fitted with an N.E.C., 2-cycle 4-cylinder engine, the Mulliner monoplane, the Warwick Wright monoplane (£650 complete), and two Humber monoplanes and a Humber biplane. A British-built Santos Dumont "Demoiselle" and a Blériot cross-Channel type monoplane were among the exhibits. One of the Humber monoplanes was designed for the firm by Hubert Le Blon, whose performances at the Doncaster meeting have already been described, and this seems to have been the first to depart from the open trellis-work fuselage, for its body was a tapering cylinder of thin wood bound with tape.

A Humber machine built for Captain Lovelace had accommodation for two passengers, one on either side of the pilot and each passenger with a control wheel. It was fitted with a 50 h.p. engine, and it may be assumed that with full load it would never have flown. The Star Engineering Company of Wolverhampton showed a monoplane. Mr. Handley Page exhibited a monoplane of natural wing form.

At this Show the famous Bristol aeroplane firm made its first appearance with a biplane built by the French Zodiac Company. George and Jobling showed the smallest biplane, one with a span of only 30 feet, and a feature of this was the control whereby rudder, elevator, and ailerons could be operated by one hand, each without interference with the others. The radiator tubes were part of the bottom wing.

Here were the machines on which Mr. Moore-Brabazon and the Hon. C. S. Rolls had been making flights at Shellbeach. These, with Mr. Nicholson's monoplane and a new Sommer biplane belonging to Mr. Rolls, were shown by the Royal Aero Club. Mr. Moore-Brabazon's Short biplane was the one on which he won the £1,000 prize for the first circular flight of one mile in this country. It had points in common with the Wright machine, but it was a divergence from the Wright type in that its two propellers revolved in the same direction. Mr. Short's practical experience had taught him there is no appreciable gyroscopic effect even with high-speed propellers, and that, therefore, there was no reason for running them in opposite directions. It was curious to note, however, that Sir Hiram Maxim still referred to the gyroscopic action of propellers as if it were a serious factor. Mr. A. V. Roe's triplane was again exhibited.

Among the engines the most prominent were the N.E.C. two-cycle, the production of Mort Brothers. This was the engine used by Mr. Ogilvie on his Wright, and it is most unfortunate that it was never fully developed, for there can be little doubt that had it been given the attention and expenditure possible only to a wealthy firm it would have become established. Quite probably it and some other engines were driven out by the sudden success of the Gnome motor. The Green engine was another perfectly sound British type, which survived for many years and attained many notable successes. There was a Wolseley motor, a Thames Ironworks and Engineering Co.'s motor, and a 40 h.p. Trier and Martin.

Among the accessories and materials bamboo was conspicuous, and it will be remembered that Cody had great faith in it. A conspicuous exhibit at Olympia was the Willows airship.

The Paris Show of 1910 was held in October, and, although officially designated the second was, as already explained, really the third of the series. It surpassed its predecessors in every way, and the enormous strides made in aerial science during the previous twelve months were not only evident in the machines and motors, but by the fact that the inaugural ceremony, attended by five ministers, was the signal for new practical demonstrations of the capacity of aircraft to render services in war and in peace. Naval Lieut. Byasson left Buc on a Maurice Farman biplane, flew over the French capital, and landed on the military drill ground at Vincennes, while Wyjnmalen, Legagneux, and Martinet mounted their Henry Farman biplanes at Issy-les-Moulineaux and paid a visit to the aero show by circling round the Grand Palais. The next morning Legagneux, accompanied by Martinet as passenger, and Wyjnmalen, with Dufour as passenger, on their Henry Farman machine, sstarted for Brussels, while the airship Clément Bayard, with seven passengers on board, started on its long-announced voyage from Lamotte Breuil, across France and the English Channel to London.

On the Blériot stand four monoplanes were shown. They were—the machine piloted by Leblanc in the memorable Circuit de l'Est; the little monoplane propelled by an Anzani 25 h.p. motor on which Blériot crossed the Channel in 1909; the new machine flown by Georges Chavez in his flight over the Simplon Pass; and a larger monoplane fitted with a 100 h.p. Gnome motor. All these types were constructed on the same principle, and differed little except in size.

The Antoinette monoplane with which Latham had performed so many remarkable feats was a prominent feature in the Show. Like the Blériot, it had not undergone any radical alterations in form or construction. The fuselage was 36 feet long, and had the form of a boat, while its wings had a span of over 49 feet, and gave a total area of 377 square feet.

It will be remembered the Antoinette motor was the first very light aero-motor produced. It was thanks to that engine that M. Santos Dumont, who, by the way, had now abandoned aeronautics for astronomy, first flew at Bagatelle, and that M. Henry Farman made his first out and home flight.

Henry Farman showed a two-seater "touring" biplane. The upper surface of this biplane had nearly double the span of the lower plane, and was made to fold down, so that the machine could be housed in a comparatively small shed. It was, however, his military biplane, employed not only by the French Army, but by Weymann, Wyjnmalen, Legagneux, Martinet, and many other aviators for long distance and altitude flights, which made the inventor's name.

The machine shown by his brother, Maurice Farman, had double or even triple wires or stout steel cables at some points. Its controls were practically identical with the standard control in general use to-day, and this was the subject of much discussion, and was generally approved.

The new Voisin biplane on which Bielovucie had made a flight from Paris to Bordeaux, and for that reason called "Bordeaux type", in no way resembled the bandbox-like aeroplane used by Henry Farman at Issy-les-Moulineaux in 1908 to fly the first closed-kilometre circuit, or the equally cumbrous machine piloted by M. Louis Paulhan at Bethény in 1909. The Brothers Voisin, by the way, were the first to establish an aeroplane factory.

The Coanda aeroplane was perhaps the most remarkable novelty in the Grand Palais. The body, wings, and rudders were made of wood on a steel framework, and the machine had an encased propeller resembling a turbine. The wooden cruciform tail acted as horizontal and vertical rudders combined, and was worked by a wheel. The warping of the wings was operated by pedals.

The Deperdussin monoplane attracted attention on account of its long tapering body and graceful lines. The wings were warpable. One of the features of this machine, which was driven by a 50 h.p. Clerget motor, was the six-bladed propeller. The chassis was built on steel tubes.

A remarkable aeroplane was the "Bicurve" of Sloan & Co. The makers claimed, "We do not pretend to avoid all accidents, but we have the pretension to prevent very serious accidents from becoming mortal, and to render the others benign." The apparatus had two planes, of which the lower one was the main lifting surface. The upper plane at the centre was 4 feet 7 inches above the lower plane, towards which its extremities were curved down, thus forming a kind of arch. It was claimed that this secured lateral stability, and that the upper plane in gliding descents acted like a parachute.

There were Aero Shows at Olympia in the spring of 1911, and in 1913 and 1914, and at Paris in 1911, 1912, and 1913. I do not propose to describe them, for exhibits of any importance duly took the air. The shows at Olympia were not very well attended: a fair, steady stream of sightseers, but no crush. There was always one of the best military bands, and always a "Royal Visit" day. Olympia, however, was a cheerless place on a cold day, draughty and uncomfortable. At one of these shows the late Percival Spencer caught the chill which terminated a valuable life. At Olympia there was no attempt at homogeneity or harmony of decoration and staging. What a contrast were (and are) the French shows at the Grand Palais; and why is it that the British can see these things year after year and never learn the lesson? Here, surely, is a deep-seated fault in the national temperament.

I find the following few notes selected at random on the British and French shows between 1911 and 1913 which may be of interest in retrospect.

"One of the most suggestive features in the Paris (1911) Show is, strange to say, the oldest form of aerial locomotion, the plain Montgolfier spherical balloon. A revived form of this balloon, which is now on view, may enable every man to become an aerial navigator.

"The earliest balloons were, as is well known, lifted by hot air, produced by the burning of a quantity of inflammable material under the open neck; and in many cases a fire has been carried aloft in order to maintain the heat. This method is clumsy and, although less costly than gas, it requires a large balloon, which often becomes ignited in the course of the ascent. Now a means has been found to make the Montgolfier balloon accessible to all, and the time is clearly at hand when thousands of middle-class people will keep their own balloon, and make voyages through the air without being in the least dependent upon the gas companies or any other outside help.

"It will be done in this way. The balloon, with a neat little basket, will cost about £100 complete, with its small petrol stove slung up in the open neck, which is prevented from catching fire by a wall of non-inflammable material. To inflate a balloon of about 50,000 cubic feet capacity will cost no more than half a crown, and a quantity of petrol can be carried in order to prolong the voyage if desired. The navigator will be able, by lowering or raising the flares, to increase altitude or reduce it as desired, and he may carry a small quantity of ballast especially for use in landings. The cost of this pleasant sport, therefore, will be trifling. The most considerable item will be travelling home again after a voyage, but in this respect the cost of the conveyance of the balloon will be small, for it can be packed into a very small compass."

Of aeroplane controls I had occasion to write: "There is a divergence of opinion as to whether the lever with a handle or with a steering pillar with a wheel is the better control system. The consensus of opinion seems to be in favour of the wheel; it is being substituted for the lever on many machines with the Farman control, and the Bristol machines are now being fitted with it. The orthodox, sometimes known as the Farman, control is adopted by quite a large number of makers. It consists of a lever for the right hand, and a foot lever. The forward movement of the hand lever depresses the elevator, so that when the flyer observes the head of the machine inclining upwards, he instinctively pushes the lever forward, resisting the movement. The same lever corrects lateral inclination in the same way; for instance, if the right extremity is tilting upwards, the aviator pushes the lever away to the right, against this tendency. This movement depresses the ailerons on the left extremity, thus raising the left wing. The to and fro and sideways movements of the lever combine, and nearly always the handle is moved in circles. The foot lever is a straight bar pivoted in the centre. For turning to the left the aviator pushes the left side forward; the right side turns to the right. The beauty of this combination is that in turning to one side, the left, for example, you move the left foot forward, and in order to bank your machine up on the right to effect a good left turn, you simultaneously pull the hand lever also to the left.

"In the new Wright control, shown on Mr. Ogilvie's Baby racer, a lever held in the right hand has a hinged handle which is easily moved from side to side, working the rudder independently of wing warping. Fore and aft movements of the whole lever work the wing-tips in combination with the rudder. The left-hand lever is moved to and fro to control the elevator. The Graham-White has the Farman control, but this is duplicated, so that when the driver's right arm is weary he can rest it and work with his left hand on the duplicated lever. The Bréguet biplane has a unified control, consisting of a wheel on a steering column. Movements of the whole lever fore and aft work the elevator, as in Farman practice; sideways movements actuate the wing warping with the same effect as if ailerons were used; and the rotation of the wheel steers the machine to right and left. In this machine the control is contrived so that when on the ground the wheel turns the front of the landing carriage. The Handley Page monoplane is another machine with a universal steering column.

"The Cody has a single lever and steering wheel. The front elevator is rigidly attached to the bottom of the column, the ailerons to the rocking lever. The rudder is mechanically turned to counteract the drift caused by moving ailerons and elevator.

"The control of the automatically stable Dunne monoplane has particular interest, the machine having no rudder in the usual sense of the word. The driver employs two levers, one on each side, and each lever is coupled to one of the hinged extremities of the plane. The Dunne machine has the plan form of a shallow V with the apex forward. The two extremities have a downward dip and the rear part of each extremity takes the form of a hinged flap. Each of these flaps is moved independently of the other, in which respect they differ from the universal practice with ailerons or balancers. The machine is steered to right or left by bringing one of these flaps down, causing a drag on that side. Alterations of altitude are made simply by accelerating or retarding the engine."

Of the Paris 1911 Show.—"The absence of merely 'freak' machines from this Show is an exceedingly healthy sign. Indeed, there is not a single machine obviously made in complete ignorance of the conditions of aerial navigation and of the laws of sound construction; although there are contrivances with which fault can be found. For example, the Paulhan-Tatin aerial torpedo, for which a speed of ninety miles per hour is claimed (it is not stated whether this has been obtained in a circular flight or independent of wind), is obviously incapable of an easy landing; it must take the ground at something like sixty miles per hour, and, therefore, is scarcely to be commended for military or other purposes. The Blériot limousine made for M. Deutsch de la Meurthe is in some respects freakish: it would be very unstable in a wind; in landing, the pilot, who is seated outside the handsomely-appointed saloon, and the passengers, in the saloon, would fare badly in anything like a bad bump; and the accessories, such as the head lamps and the transparent shield for the pilot's head strike one as bizarre. Finally, some of the monoplanes have their centre of gravity so far below the line of air pressure that they would, in uneven air, begin to oscillate and render the task of keeping equilibrium difficult.

"A number of automatic stabilisers are shown. The principal one is the Doutre, which is concerned only with longitudinal stability, and has proved fairly successful. The principal device to secure lateral stability and prevent a machine from being canted up to the right or to the left by gusts is seen in the Sotinel monoplane. In this machine each wing is divided at a distance of about one-third of its length from the extremity, and the two extreme sections move in opposite directions to the main members. Thus, in the event of the wind canting the right wing up the right extremity of that wing is, by a pendulum arrangement under the main body of the aeroplane, caused to depress its leading edge, with the result that the tendency of the right wing to rise is at once neutralised by its reduced lifting power."

"The increasing use of metal in the construction of aeroplanes is noticeable. The Aviatic has a metal body, the Morane-Saulnier has a blunt-nosed steel body, with six large holes in the front to admit air to cool the rotating Gnome motor; the Paulhan-Tatin monoplane has a partly metal body; the Ponche and Primard monoplane is nearly all metal, even the wings being of sheet aluminium. Steel tube is used in some machines for the framework of the wings and for the main spars and struts."

Writing on the Olympia Show of 1913: "In the two years since the last Aero Show at Olympia, aeroplanes and airships have made noticeable progress. In construction there has been steady improvement, and many of the machines at Olympia, particularly the seaplanes, contain striking novelties in design, as well as numerous details not so apparent to the unprofessional eye—subtle changes in wing-section, due to the researches of M. Eiffel and others, and refinement in general form, by which air resistance has been reduced. As a result, apart altogether from the use of improved and more powerful motors, something like 30 per cent. increase of efficiency has been made in two years. The following comparison in a general way shows the improvement that has been affected since the beginning of 1910; three typical aeroplanes of 1910 are taken, and machines of to-day as nearly as possible corresponding to them are also given:

1910

	H.P.	AREA SQ. FT.	WEIGHT IN LBS.	MAX. SPEED M.P.H.
Biplane ..	80	800	2240	45
Biplane ..	50	450	1230	40
Monoplane ..	50	170	550	50

1912–13

	H.P.	AREA SQ. FT.	WEIGHT IN LBS.	MAX. SPEED M.P.H.
Biplane ..	70	680	1930	56
Biplane ..	50	335	1700	62
Monoplane ..	70	198	1536	71

" The figures are eloquent, weight-carrying and speed having greatly increased with approximately the same power. And in most cases there is to-day a considerable range of speed; the machines are better made and more comfortable. In practice, as the War Office competition last August showed, the machine of to-day can fly a distance of 350 miles on one charge, it can climb at the rate of 1,000 feet in three minutes, and can stay aloft for four hours. And this is not taking an extreme case.

" Some interesting problems suggest themselves, taking a broad view of the Show. One concerns the biplane class, among which are six of the tractor type, four of the older type with engine and propeller behind, which flourishes exceedingly despite the gloomy anticipations of certain prophets two years ago, and one machine representing the latest development, having the engine in front but the propeller behind the main planes. As to the engine-behind division, it is nowadays very much better in general design both in the latest productions of the Farman Brothers and in other makes. Taking the M. Farman and H. Farman machines, the latter is the interesting three-seater military biplane. (Both are made under licence in this country). The M. Farman has particularly proved itself to be a remarkably good machine in many ways, and its wind-flying qualities are wonderful, showing that high speed is not the only road to that essential. M. Pierre Verrier recently flew it from Hendon to Farnborough in a gale of fifty-seven miles per hour. Other land machines with the engine behind the pilot are the Cody biplane, which was victorious over all competitors in the War Office aeroplane trials, and is so well known that it does not call for description here, and the new Vickers, which is made largely of steel, and carries a Maxim gun and 1,500 rounds of ammunition.

" The one machine with the engine in front but the propeller behind is the Grahame-White biplane, a three-seater driven by a 90 h.p. Austro-Daimler motor. It is remarkable for the open triangular fuselage with the apex uppermost, the propeller being carried on the top boom immediately behind the body in which the pilot and passengers are seated, and which rests on the lower plane. Among the advantages claimed for this method is that it secures a sound disposition of the load. Further, it relieves the pilot of the discomfort of having the propeller in front of him, where, moreover, it would prevent the free use of any weapon; and this machine is provided with a quick-firer.

" The tractor biplanes are the B.E. 2 of the War Office, also armed, the Avro, the Bréguet, the Bristol, the Caudron, and the Sopwith. All are British-made with the exception of the Caudron, which, by the way, is another slow bus that equals anything aloft for wind-flying qualities. Only one of this list is a novelty, namely, the Sopwith three-seater, which has a monoplane-like fuselage, the nose resembling that of the Nieuport with its 80 h.p. Gnome under a cowl. One of these is employed at Eastchurch for training purposes. The main dimensions are: area, 520 square feet; span, 44 feet; length, 26.4 feet; net weight, 980 lbs. A range of speed of thirty-eight to seventy miles per hour has been obtained on it.

" The most original design is perhaps Messrs. Samuel White & Co.'s double-camber seaplane, the design of Mr. Howard Wright. In this the main planes are slightly swept back, as in the Handley Page example, and have negative wing tips with double-acting ailerons. The wings are of a new cross-section, in which the centre of pressure moves very little for wide differences in the angle of incidence; thus between the angles of incidence of 3 deg. and 15 deg. the centre of pressure does not, it is claimed, travel more than 2 per cent. of the chord length. A 160 h.p. Gnome is mounted, and by the use of the throttle and by flying with the wings at a big angle or a small angle, as the case may be, the speed may be varied from thirty to sixty-six miles per hour. It would be well if other designers would see the importance of combining with high speeds the quality of slow flight, enabling a machine to land slowly, as Mr. W. O. Manning suggests. The tail of this machine is non-lifting. The twin floats are of a new design; they have three steps, and a rudder at the end for direction in water. Engine, pilot, and passengers are carried in a body about half-way between top and bottom planes, and the front of the body projects considerably. The main dimensions are: area, 500 square feet; span, 44 feet; length, 30 feet; weight, fully loaded, 2,000 lb.

" The Sopwith 90 h.p. Austro-Daimler seaplane is a beautifully made cedar hydroplane surmounted by a biplane. The boat itself weighs no more than 180 lb. The engine is mounted midway between the two main planes which both have a slight dihedral form. The tail and elevator are carried out at the rear on booms. This machine has an area of 400 square feet; span, 41 feet; length, 32 feet; net weight, 1,200 lb. The Grahame-White hydro-aeroplane has a closed-in fuselage, resembling the Nieuport body."

Of Olympia, 1914: " This show differs from any of its predecessors in many important features. In the first place the large proportion of seaplanes is apparent; of the twenty-five flying machines, nine are seaplanes. Next, the preponderance of the biplane over the monoplane division is very noticeable, sixteen of the machines being biplanes. It is then to be observed that only one of the monoplanes is of British design. But more important than any of the tendencies referred to is the fact that the Show very fully reveals the trend in British aircraft design towards the production of biplanes having a wide range of speed. Speed-range as against mere high speed has been curiously neglected by the pioneer flying country, France, so that, even in the Paris Show of last December, the great majority of the machines were fast monoplanes, in the production of which class the French have all along been supreme, as witness the winning of the Gordon Bennett last year with a speed of 126½ miles per hour. The importance of range of speed lies in the fact that a machine capable of keeping aloft at a low speed is a machine that can be flown by a pilot of average skill, and that can land safely in a circumscribed space. The Gordon Bennett racers of last year were machines of no practical use; the winning machine would run 500 yards after alighting with the engine stopped, and it could only be handled by a man of exceptional skill, and could only be flown across country at grave risk.

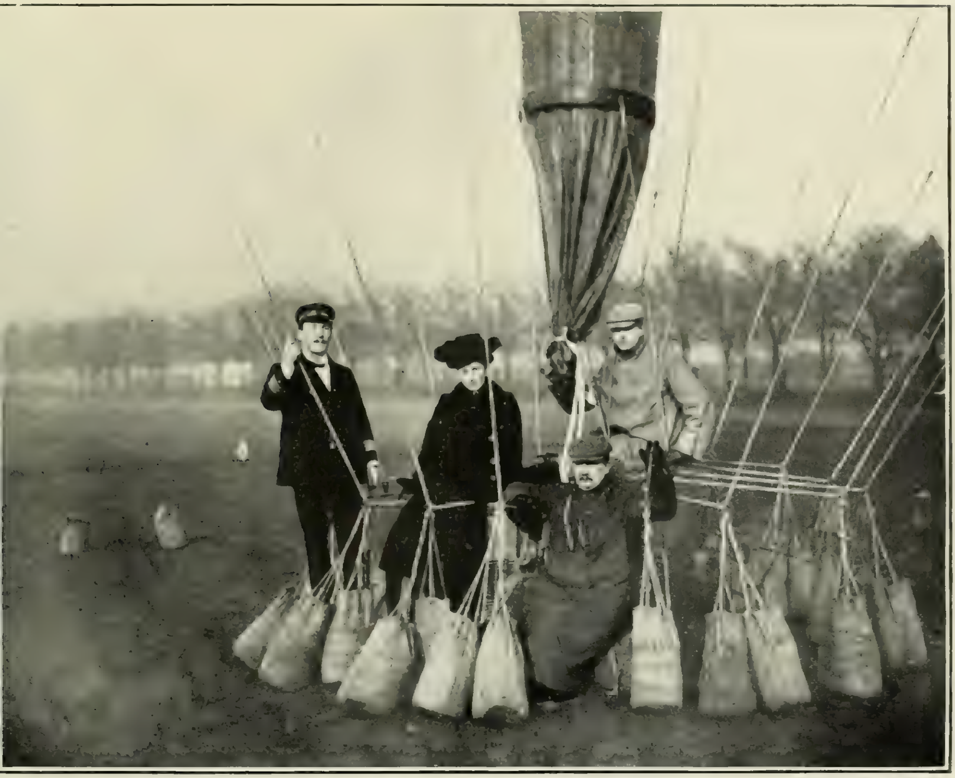
"The speed-range machines at Olympia are British-designed biplanes. All the Avro machines come under this head, as do the Bristol, the Grahame-White, and the Vickers, without at the moment counting the seaplanes. Special attention should be directed to the Avro single-seater scout, a craft with sloped-back wings; that is, seen from below against the sky, having a shallow V form, the apex in front. This is a form of plane that gives a large measure of natural stability. It is a favourite form with German makers, and most of the German army aeroplanes are of the so-called 'Arrow' type. The Avro Scout, with a maximum speed of 100 miles per hour, will just fly at thirty-five miles per hour, an unprecedented range. The Vickers and the Bristol two-seaters have an almost equally big range of speed. Other speed-range craft, but slightly slower on the top speed, are the various military biplanes; the Bristol, a type to be met in service use in a dozen European armies; the Maurice Farman, a slower craft, but popular in the Flying Corps because of the ease with which it is flown and the excellent view it affords; and the Vickers armed biplane a notable machine for various reasons, among others its steel construction.

"Aeroplanes do not get cheaper. No attempt is being made by manufacturers to appeal to other purchasers than Governments and the wealthy. So much is plainly evident at this Show. Indeed, aeroplanes have gone up in price since 1900. At Olympia the cheapest machine is a 500-guinea seaplane, and there is scarcely another machine near it as to price. Two or three years ago a few low-powered aeroplanes were on the market at prices ranging from £250 to £500. It is possible to buy cheap machines to-day, but as there is no steady demand for them makers no longer show them. The reason for the increased price of aeroplanes is the steady increase in the power of the engine employed. In the Show of 1910 the most powerful was one of 50 h.p. Most of them were driven by motors of 25 or 30 h.p. There was an Avro biplane of 20 h.p. In this Show the lowest powered machine is one of 50 h.p.; there are several of 70 and 80 h.p., and two with 200 h.p. engines."

(There is a note to the effect that the Flanders monoplane with a 60 h.p. Green engine cost £750 with the guarantee that the machine would fly for fifteen minutes with a passenger and perform figures of eight.)

"It is possible to fly with very little power. The Wright machine of the early days was driven by a 26 h.p. motor, and it flew extremely well. Wilbur Wright claimed that he could fly with 15 or 16 h.p. As a matter of fact, Mr. A. V. Roe has flown with 12 h.p. M. Blériot crossed the Channel in 1909 with a very uncertain 25 h.p. motor. Present-day (1914) machines, 70 and 80 h.p. engines, must make a much stronger appeal to the private flyer than anything hitherto put on the market. Take, for example, the new Sopwith tractor biplane. This is designed for military use, but it is a very much more practical affair from the tourist's point of view than any aeroplane of three years ago. It is fitted with dual controls, and with a quick-release catch, enabling the pilot to start it without outside help. It affords passably comfortable seating. And it has a speed-range of something like 40 to 85 miles per hour. This is the machine upon which Mr. Winston Churchill has lately had several flights. If it had been available five years ago there would have been a tremendous boom in flying; perhaps it is as well it was not! To the same category belong Avro, Bristol, Farman, and other makes of aeroplane.

"The amateur flyer who wants an overland machine for pleasure will from the present time and during the next few years be able to choose between paying £400 and £1,200 for his mount. But there will always be more expensive aeroplanes. The multi-engine craft, like the giant Russian, which has been soaring about with fifteen or sixteen people in it, will be one of the most important developments. Machines of this kind will be used in the services, for passenger-carrying lines, and also by private sportsmen."



Left to right:
The late Stanley Spencer, Miss Vera Butler, Mr F. Hedges Butler, the late Hon. C. S. Rolls

FOUNDING OF THE AERO CLUB, SEPT. 24, 1901.

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CHAPTER XXIV

THE ROYAL AERO CLUB

About 1883 Major B. Baden-Powell had tried to start a Balloon Club, but there was too little support for this project; later, when Colonel Brine formed a Balloon Committee, which endured for a few years, ballooning as a sport was on the decline. For a time the Rev. J. M. Bacon and Major B. Baden-Powell were almost the only aeronauts outside the domain of the village fête showmen; but with the coming of the twentieth century, and no doubt inspired partly by the success of the French Aero Club, there was a revival of interest in Great Britain. Among the new generation of balloonists were Mr. Frank Hedges Butler, Mr. Leslie and Mr. Ernest Bucknall, the Hon. C. S. Rolls, Mr. John V. Dunville, Mr. C. F. Pollock, and Professor Huntington; and the Aero Club of the United Kingdom was inaugurated on September 24, 1901, during a balloon ascent by Mr. Frank H. Butler, Miss Vera Butler (now Mrs. Iltid Nicholl), the Hon. C. S. Rolls, and the late Mr. Stanley Spencer (the professional aeronaut in charge). The balloon trip was the suggestion of Miss Butler, and during its progress the idea of the Club was discussed. The name "Aero Club" was registered at Somerset House by the late Mr. Claude Johnson (who was at that time the Secretary of the Automobile Club), in fulfilment of a proposal by Mr. Roger Wallace at a meeting of the Committee on October 21, 1901.

Major B. Baden-Powell, in the Preface to his book *Ballooning as a Sport*, says:

"I joined the Aeronautical Society which, by the way, was then (1880) rather laughed at because the members would talk in a dreamy way about flying machines instead of devoting themselves to the practical and existing appliance, the balloon! But it has outlived all that and, founded in 1866, remains to this day as the premier aeronautical institution in the world. About this time the Aeronautical Club was formed as an offshoot of the Society. This, however, did not last long. Some half dozen members used to meet of an evening in a room in Conduit street to discuss matters in an unconventional way. We had several interesting talks, but this sort of thing soon palled on one. We had no funds to do anything more.

"Next a fillip was given to the matter when Commander Cheyne came forward with a scheme for going to the North Pole by balloon. Several ascents were organised with the idea of testing the suitability of balloons for arctic use, and during this boom the Balloon Society was started. This came in with a flourish of trumpets, and was well-advertised, and held many well-attended meetings. But it was badly run and rapidly deteriorated."

The Aero Club was for years too small to possess its own premises, and for a time it used the Automobile Club, then in Piccadilly. The first secretary was Mr. Pope; and he was succeeded by Mr. Harold Perrin, who has remained secretary to this day, and has thus grown up with an organisation which from a very humble beginning has become so important. For a time Captain Claremont was associated with Mr. Perrin. Mr. Perrin's vigour and energy were just the qualities necessary to a body which, from the very start, had to fight battles with adversity, with opposition, and with stupidity. I remember him first in connection with balloon races from Ranelagh, and one of my earliest recollections was a visit to his office in the City. It was on a Saturday, about the hour of lunch, and there was to be a balloon ascent in the afternoon. Mr. Perrin, I remember, made me accompany him first to a hat shop. "I must have a new straw hat," he said. But I failed to see then, as I fail to see now, why that should have been necessary for a balloon ascent. I think he explained that on a hot day in the basket of a balloon, where no wind is felt, a straw hat is the ideal head-gear. The wind will not blow it off. In a rough landing, however, it is apt to be in the way.

The Club moved to 166, Piccadilly, in 1908 or 1909, and there it was possible to get a cup of tea, but no meals were served.

Ballooning at that time was the sole concern of the Club, and there was rivalry between the aeronauts as to which of them should be the first to reach his hundredth ascent. It may be interesting to recall a typical announcement. I find the following:

"The third Aero Club meeting will be held at Ranelagh Club on June 29, 1907, at 4 p.m., weather permitting. The following cups and prizes will be competed for: The Northcliffe Prize, presented by Lord Northcliffe for the balloon or aeroplane that travels the longest distance in the United Kingdom in the year 1907; Hedges Butler Challenge Cup, presented by Frank Hedges

Butler, Founder of the Club, for balloons or flying machines; Ranelagh Club Prize, presented by the Committee of Ranelagh Club."

Before coming to more personal associations, a word or two about the functions and general outlook of the Club. From the first, although so far as practical work went it was for many years limited to ballooning, it comprehended all branches of aeronautics, and when flying became practicable the official position it held in the matter of air sport of all kinds brought to it sooner or later all, or nearly all, the aeroplane experimenters. Mr. Hedges Butler and the late Hon C. S. Rolls were among the first passengers taken up by the Wright Brothers in their flights in France in 1908, and many of the balloonists soon became actively associated with flying developments.

Mr. Butler had been one of the pioneers of the Automobile movement, and he was, and still is, a great traveller, whenever possible using the airlines. His little book, *Five thousand miles in a Balloon*, published many years ago, is a most interesting record, and should be read by all who wish to understand the old ballooning times, and there are many other books relating to that period. The Club became "Royal" in 1910, and I have turned up the following note:

"The Aero Club, which, by the King's permission, is now to be known as the Royal Aero Club of the United Kingdom, is more familiar to the public than the Aeronautical Society, because its particular domain is that of sport.

"The club has just moved into new premises in Piccadilly, where, on the third floor, a very spacious smoking-room has what is surely one of the best club outlooks in London. It faces directly up Bond Street.

"This is a delightful resort, largely on account of the very interesting men who use the club, many being those on whom Great Britain relies to build up and preserve a name in aviation. To mention a few: The Hon. C. S. Rolls, Mr. J. T. C. Moore-Brabazon, Mr. A. M. Singer, Mr. Cockburn, Mr. A. E. George, Professor Huntington, and Mr. F. McClean are to be seen here from time to time.

"This is a busy club, for it has the burden of this country's interest in aeronautical sport on its shoulders. It has to deal for Great Britain with the International Federation. As everybody knows, it has come in for a good deal of criticism. On the other hand, it has been confronted with some extremely difficult situations. The secretaries, Captain Claremont and Mr. H. E. Perrin, have an enormous amount of work to get through.

"Both the Aeronautical Society and the Royal Aero Club include many ladies in their lists, and the Aeronautical Society possesses a boy who has shown remarkable skill in making models, and also a young lady, who has not yet left school, but who already has given evidence of a scientific and ingenious bent of mind. Many members of the Aero Club are members also of the Aeronautical Society.

"There remain two patriotic organisations, the Aerial League of the British Empire and the Women's Aerial League, with its offshoot the Boys' and Girls' Aerial League. Viscount Esher is the president of the Aerial League, the council of which is an exceedingly strong one. To put it in a few words, the policy of the League is to disseminate knowledge and spread information, and to encourage the industry of aeronautics in this country. The Women's Aerial League appeals to women on the same lines, and is doing equally good work. The Lady O'Hagan and her business-like and energetic council have achieved wonders with means that have been all too small."

Those who were members of the Club in the early days will always regret the cosy flat we had at 166 Piccadilly. At that time every member of the Club who used the Club premises was an enthusiast. There, almost any afternoon and early evening, one would meet such men as Cody, Mr. T. O. M. Sopwith, "Jimmy" Valentine, Graham Gilmour, Mr. Gordon England, Mr. F. May, Mr. Dashwood Lang and Mr. R. F. Wickham. Then, too, we had the late W. B. Rhodes-Moorhouse.

The late Farnall Thurstan was a notable Club figure. He organised for the Bristol Aeroplane Company a series of flying expeditions which began in 1910, and by the summer of 1914 had embraced every important country in the world. Thurstan was personally in charge of most of the commissions, and from the extent of his travels and the number of countries he visited, his knowledge of international aviation on the outbreak of the War must have been unique. Between his visits to foreign countries Thurstan acted as manager to the Bristol Flying School. Much pioneer work was done in Continental countries by the Bristol Company's expeditions, and among the famous aerodromes connected with them and their representatives may be mentioned the Italian aerodrome near Milan (in conjunction with Caproni), Quatre Vientos at Madrid, Doberitz and Halberstad in Germany, Aspern (near Vienna), Buda Pesth, and Bucharest.

Shortly after the outbreak of war Thurstan was granted a commission in the Royal Naval Air Service, and immediately was sent to France to take command of the Naval Air Service Depôt at Paris. Here he was responsible for the bulk of aeronautical supplies to the Naval Air Forces on the Belgian coast and in the eastern theatres.

Lieut. Colonel H. Delacombe was, and is, one of the best-known members of the Club. He was in command at Roehampton at one time, and all who served under him will ever remember his tact and kindness. After the War he was associated with Mr. Holt Thomas in civil air transport developments.

Another energetic worker was the late Major J. N. C. Kennedy, R.E., who brought to the very scanty operational experience of flying that we possessed before the War the practical knowledge of an exceptionally efficient Sapper. He studied flying accidents, and opened several discussions on that subject. He had an important command in the South African War, and was an expert on mine-laying which, so far as the coasts were concerned, was at one time the work of the Sappers. He used to claim that this work was done satisfactorily until the Admiralty took it over! Also he was an expert on railway work, and he invented a new signalling system which was used by the London and North Western Railway, by which company he was employed for some years. I remember visiting him at his house at Rugby, and being shown this method in operation. He was at Rugby when the Great War began, and on the night of that never-to-be-forgotten August Bank Holiday, just after I had returned home after a flying meeting at Hendon, he called me up on the telephone from Rugby and asked me about the situation. I told him it was quite certain Great Britain would declare War, and that only the wildest optimists imagined it would last less than three years. The next time I heard of him he was at Aldershot drilling the New Army, or as he put it, "sweating the beer out of them." He did not spare himself, and shortly after the outbreak of War died from pneumonia.

There were at all times a number of lady members of the Royal Aero Club, but they are not permitted to use the Club house. Several of them have been balloonists, and of these the best known in ballooning days was the Hon. Mrs. Assheton Harbord, who made nearly two hundred voyages and crossed the Channel by balloon on more than one occasion.

Lieut. G. Wildman-Lushington, of the R.M.A., preferred the Aero to all other Clubs, loving the atmosphere of the place. A smallish man of sanguine temperament and colour, full of "beans", and a universal favourite; also a great pilot. He was killed in an aeroplane accident at Eastchurch in December, 1913.

Mr. H. R. Busteed often came in fresh from some adventure in the air. He was the first Australian to get a pilot's certificate. He trained many Navy and Army Officers to fly, and he had a distinguished war service; and that reminds me of Captain Oswald Watt, the first Australian officer to fly (Certificate No. 112). He did great work in the war, first serving with the French air force.

Other familiar figures were (and some still are with us), Mr. H. A. Petre ("Peter the Monk") who "taught Australia to fly," and is now on the Committee of the Club; his brother, the late Edward Petre ("Peter the Painter"); Mr. Oscar Morison, Commander (now Air-Commodore) C. R. Samson, Lieut. (now Lieut.-Colonel) Spenser D. A. Grey, Air-Commodore E. L. Gerrard, Mr. (now Lieut.-Colonel) Mervyn O'Gorman, Mr. F. Handley Page, Mr. A. V. Roe, M. Henri Jullerot, the late Lieut. J. C. Porte, the late Lieut. Wilfred Parke, the late Collyns Pizey, Mr. C. Grahame-White, the late Gustav Hamel, the late B. C. Hucks, the late Gordon Bell, Mr. G.C. Cockburn, Mr. T. Howard-Wright, Mr. Warwick Wright, Major Maurice Wright, Mr. W. O. Manning, Mr. J. H. Spottiswoode, Mr. E. V. Sassoon, the late J. L. Travers, Captain F. L. Boothby, Mr. E. R. Adams (the first aviation insurance expert), the Hon. Maurice Egerton; A. V., A. F., and C. A. Bettington, Major J. A. Halford, Mr. H. S. Wildeblood, the late Lieut.-Colonel C. E. Risk, T. A. Rainey, Major O. T. Gnosspelius, Mr. T. S. Cresswell, Admiral Mark Kerr, Colonel A. G. Board, Mr. T. P. Searight, and a host of others.

During the War the Club moved to its present house in Clifford Street, and became a Club in the larger sense of the word, with bedrooms and dining-rooms. For a time after the War a proportion of the members were engaged in other interests than aeronautical; but happily that phase has passed, and nowadays we have entirely recovered the old atmosphere and spirit, with the additional interest afforded by the great modern developments in all departments. Happily, too, a considerable number of the older members are still with us, whilst new blood is provided by famous War pilots and by the personnel of the air lines. In the winter there are monthly House dinners, followed by a brief paper on some subject of the moment by someone well qualified to deal with it, and a free and informal discussion, always useful and often amusing. The chair is usually taken by the Chairman of the Club, and there are generally one or two distinguished guests or visitors, the Secretary of State for Air, or the Under-Secretary, or some famous foreign aeronautical expert.

Flying men have always been a light-hearted lot, and middle age does not bring them excessive gravity, although the War brought responsibilities to men who were previously obscure, and these responsibilities have left a certain mark on them. I remember a famous maker of aeroplanes who, looking out of the window of 166, Piccadilly, wagered a friend that he would go down into the street and lie on his back in the middle of the road. The offer was accepted and, to the amazement of the "taker" the "challenger" left the room. A minute afterwards he was seen in the street below walking out into the road where there was a line of taxicabs. He engaged one of the drivers in conversation, both looking at the vehicle. Then the famous airman was seen to get down on his hands and knees, watched by the taximan, and to crawl under the cab lying on his back as if to inspect its construction. In a minute he emerged, and something passed from his hand to that of the cabman. He returned to the Club room and took the money from his amused and rueful victim.

I suppose every club has its principal workers, men who through long association, experience, tact, business ability, and affection for the Club's life and purpose give much to its service for no other reward than the gratitude of its members. What would the Aero Club have been without such men as Sir Francis McClean, Brig.-General H. C. Holden, and, in days long ago, the Hon. C. S. Rolls. And here I must pay a special tribute to Mr. E. Bucknall, one of the old ballooning members, whose experience and knowledge of business affairs have helped the Committee in many a difficulty. Unknown to the general public, he, nevertheless, has for twenty years, or more, been one of the most valuable personalities behind the aviation movement. Not the least important of the gifts he brings is his wide knowledge of an immense range of subjects and of sport of all kinds. When he is available, as he usually is, there is never any danger of the conversation being restricted to flying or to the somewhat threadbare (and at times irritating) topic of motoring. He no longer acts as an official at flying meetings, but the first meetings knew him.

CHAPTER XXV

SEERS AND PROPHETS

Punch many years ago offered a million pounds to the flying man who would fly to Mars (or was it the Moon?), and the *Star* at about the same time offered a similar sum to the man who would fly round London. I forget whether a period was put to the *Star's* offer; but if it were not, a successful claim might have been put in for it in less than ten years after the offer was announced.

When the Wright Brothers first flew on their power-driven glider in December, 1902, the news was taken rather as a joke in this country, and in all other countries for that matter, except by the initiated. But, illustrating the prevailing ideas on flight at that period, it may be recalled that the *Daily Mail* headed a New York cable announcing the Wright Brothers' success with the words "Balloonless airship"! Balloons were fairly common objects in the sky, and Britain had heard about Santos Dumont's and Zeppelin's airships, so that it was natural enough to refer the new phenomenon to the familiar ones. Well, the flying machine is a balloon—less airship, and to this day the Americans call aeroplanes "airships", which to my mind is simply creating confusion like so many other American terms chosen, no doubt, for ostensibly good reasons.

When the late Bennett Burleigh wrote a column in the *Daily Telegraph* about the Wright Brothers' experiments, some of which he had witnessed, comparatively few people realised what a tremendous event had occurred.

For many years the newspapers adopted a sceptical attitude, and were prone to dwell on the misfortunes and difficulties which attended the hare-brained experimenter. It was all fairly good-humoured, and it did not make the slightest difference. Nobody minds this sort of thing (which won a "Limerick" prize in *London Opinion* in 1907).

"There was a young man of Mark Lane,
Who constructed an aeroplane.
It flew, so we heard,
Like a beautiful bird,
His tombstone is pretty but plain."

Seers and Prophets

I would not like to say which was the first flying newspaper, but I believe it was a monthly publication—a very excellent one—*Ballooning and Aeronautics*, of which Mr. (now Wing Commander) T. O'B. Hubbard and Mr. (now Major) J. H. Ledeboer were joint editors. It ran from January to June, 1907, and I am the proud possessor of a complete set. The price was a shilling, and every page of it is now just as, even more, interesting than it was at the time.

Major B. Baden-Powell, who was the Editor of *Knowledge*, begun an aeronautical supplement to that journal in 1907, I think, and this became a separate publication, edited by Mr. J. H. Ledeboer. It developed into *Aeronautics*, the leading British scientific and technical aeronautical newspaper, which from a monthly became a weekly. The early volumes are valuable. I edited it from June, 1919, to October, 1920, when I was obliged to give it up. It's independent existence ceased about a year afterwards. The *Automotor Journal* of Mr. F. Stanley Spooner started an aeronautical section about 1908, and this became a separate issue under the title of *Flight*. It is the official organ of the Royal Aero Club, and is very sound and well illustrated. It was the first weekly flying paper. Mr. Spooner was a member of the Executive Committee of the Aero Club at one time, and his services to aviation, following his long and useful association with motoring, deserve wider recognition. He does his work in comparative anonymity, and does not attempt to play a conspicuous part. *Flight* is a well-balanced newspaper and it is particularly well illustrated. Its technical editor is Mr. J. Poulsen, an expert of long experience.

A weekly paper called the *Aero* was published during 1909 under the editorship of Mr. C. G. Grey, and afterwards Mr. Grey produced the *Aeroplane* (in June, 1911), and he is still the Editor of that lively and forceful journal. He also conducts *All the World's Aircraft*. Both *Flight* and the *Aeroplane* fulfil very useful functions, and although they deal with the same interests they deal with them in very different ways. The *Aeroplane* reveals the striking personality of its editor, and is more of a " crusading " journal than its rival. Both papers have well-informed, technical editors, and *Flight* runs a periodical aeronautical engineering supplement. The *Aeroplane* has on its staff Captain W. H. Sayers, who flew an aeroplane and has designed several machines; and he for many years has taken a part in the aeronautical discussions at any moment raging. He possesses a remarkably extensive knowledge of aeronautics. The policy of the *Aeroplane* was avowed in its contents bill at a Lympne Flying Meeting: "We say outright what others only think"! But, alas for Editorial omniscience, others rarely think such things, for thinking which, indeed, there are but rare occasions.

Between 1908 and 1913 various attempts were made to found aeronautical newspapers. *Aerocraft*, a monthly publication, ran for a few months in 1910 under the control of Mr. Pemberton Billing, and there was a short-lived publication called *Airships*.

Coming to the lay press, the first newspaper to give space to the subject of aeronautics in every issue was the *Observer*. At first occasional reference was made to flying in the Motoring Notes, but at the end of 1908 it was decided to make a regular feature of aeronautics, and I was commissioned to write it. I continued to do this until, as a regular feature, it was stopped in 1924, since which time I have remained the Aeronautical Correspondent, but only contributing on special occasions. It was a very great pity that the pressure of other subjects should have compelled the *Observer* to drop a regular feature which had become widely recognised, and the only consolation which I, as an enthusiast, can feel lies in the circumstance that in the newspaper press generally there is increasing attention to the subject, and that the work, generally speaking, shows improvement commensurate with the increasing stability and importance of aeronautics in all its branches. That there is a rapidly increasing public for aeronautical subjects since the war is obvious, if only from the general consensus of opinion among editors that more space should be given to it; but we must also bear in mind the large number of men who served in the air forces during the War, and the increasing size of the Royal Air Force, which is a highly intelligent Service and has representatives from so many thousands of homes in the land.

As related elsewhere, I was engaged in aeronautical journalism from early in 1907. At about that time, when the *Daily Mail* began to offer its series of big prizes, Mr. Harry Harper was chosen from his staff by Mr. Alfred Harmsworth (Lord Northcliffe) to specialise on flying. Mr. Harper has grown up with the subject, and has given it the *Daily Mail* touch, and familiarised a huge public with its interest and its problems. He still writes in the *Daily Mail*, but also has a wider field. He was associated with Mr. Grahame-White in the writing of popular books on flying, and helped and advised the late Lord Northcliffe in many ways.

I have said the quality of aeronautical journalism has steadily improved. It was inevitable that it should, with the better informed state of public opinion, largely due to the great attention to flying during the war and to the educative effect of air raids on this country. Critics, however, should remember that the newspaper press is as diversified as the people it serves, and that each newspaper has its own public. Some sections have to be provided with sensational reading, others with scientific matter; and it behoves each class to realise that other classes with which it may have little sympathy or mutual understanding are nevertheless parts of a whole which is British. Provided people realise the importance of flying to the Empire, it really should not concern us very much whether they like their news with big headlines or small. At the same time, it will not be out of place here, from the point of view of one behind the scenes in flying and in journalism, to mention one or two dangers.

Some people believe everything they see in a newspaper; others believe nothing. Most of the former class join the latter sooner or later; but there is always a steady flow of new readers from the younger members of the community (and also from the older) and many of these at first attach themselves to the credulous class. There are many minor classes of readers; for example, the class whose proneness to look for inefficiency and worse in high places is catered for by a certain kind of journal. Ever since I can remember we have had that class with us for our sins, and it shows little sign of diminishing. Those who cater for it have their reward; and they are welcome to it!

Happily there is a lighter and less unpleasant side. The credulous section ask for "tall stories," and get them. They still get the aeronautical "tall story" in this year of grace, but I believe of late there has been a welcome decline in them. Yet one of the latest is also one of the most absurd. It relates to an alleged invention of a Frenchman who, the reader is solemnly assured, has made a glider with sails like a boat; a small monoplane fitted with mast and a jib as well as main sail with which "several short flights have been made!" This seems like that old illusion of "tacking" in aircraft over again, but with an additional insult to the intelligence.

No wonder the "leg-puller" is with us. The other day I saw in a local newspaper the photograph of a two-engined aeroplane with the legend underneath it, "The Vickers Bowser!" I gather that some wag in the Royal Air Force had informed the photographer that was the name of the machine. Now a "bowser" is an aerodrome vehicle employed to convey petrol to a machine in need of fresh fuel for its tanks!

We have heard about "flying railway trains," machines which were to take passengers out of London stations on the rails, and, when outside, were to be given their wings and fly away! Flying chars-a-banc and flying battleships inspire the headlines with periodic regularity. Then there was a "flying bungalow," complete except for lawn mower and dumb waiter. Of this strange craft the details of wing-span, length, speed, and duration were given in detail!

In all these stories credulity is fostered by some such phrase as "A powerful financial syndicate has given its financial support to——"; or "official tests have been made of——"; or "As the result of a technical inquiry into—at——" etc.

We are told that aeroplanes will solve the street traffic problem, and that street vehicles will simply hop over each other when they meet! The all-metal aeroplane is extolled *because* it is "shrapnel proof" (that, of course, is neither the object nor the result of all-metal construction).

Many of the taller stories are fastened on the United States or France by those who profess to be aware of "Secret experiments"; but sometimes the Air Ministry is credited with them.

An aerial city is to be built in the middle of America, and its inhabitants will have no other vehicles than aeroplanes!

Air stations on city roofs are promised as a result of the invention of moving platforms, which will be used to send the machines off and to receive them.

Aeroplanes that cannot crash, and aeroplanes that are foolproof, and machines for 200 passengers, crop up every few weeks; and one could go on for a long time were it worth while.

Not less misleading are the items of news that have a basis of fact. On the slender basis that the Air Ministry ordered three experimental types of metal aircraft we were told that there is to be a world-wide service of all-steel planes, and that Britain has given the lead to Europe. Experiments made during the War in camouflaging the wings of aeroplanes, and also in seeking a reasonably transparent wing, are from time to time revived as new. The machine with the central engine-room is trotted out as revolution in design, in ignorance of the fact that it was tried as long ago as 1917.

The subject lends itself to exaggeration, for the general public are woefully ignorant concerning even basic facts. The exaggeraters and inventors are helped, moreover, by instances of fulfilment in the face of the gloomy forebodings of sceptics. First the sceptics denied the possibility of flight, and lo! flight was accomplished! And so it has gone on, until to-day we meet people who recall the history of the early railways, and argue that because at one time there were many who were afraid to travel by rail, and that notwithstanding in a few years the railways became the principal means of transport on land, that the airways also will speedily become highly popular and as universally used.

As to the "tall stories," for which there is really little excuse, I sometimes wonder whether, in subjects with which I am less familiar than aviation, some of the newspapers are as unreliable. Some newspapers are like the Bourbons: they forget nothing and they learn nothing!

Now there is a danger in all this, and it is that of the exhaustion of public credulity, and reaction to scepticism and indifference.

The newspapers have naturally enough reflected the controversies in the aeronautical world. For some years after the Air Ministry was established it seemed quite on the cards that the Government would revert to the former policy, and that the Navy and Army would each have its own Service. The controversy went on long after the Admiralty and Air Ministry had reached a perfectly practical working agreement, and long after successive committees had urged that for reasons of economy, as well as for defence, the separate Air Ministry and the unified Air Service are indispensable. I do not want to go into that controversy here except to register my conviction that the adoption of any policy which would deprive Great Britain of a department existing solely for the study of air problems, of a Force and Staff for the study of air strategy as well as of air tactics, and of a scheme of defence providing for decisive action in the air, would be a national calamity. I do not say that the infantryman is not in most wars the man who marches in and takes possession, but I believe that the side whose infantry will do this will be the side which has the separate Air Force wielded as a distinct arm and not as an appanage to the older Services. In my experience the sailor and the soldier, no matter how enlightened, simply have not the time to know the airman's job or his point of view.

In the last few years aeronautical literature has been on the flood tide. A bibliography of Aeronautics would occupy a big volume. There are all degrees of books, from the purely scientific or technical to the lightest popularisation volume, and with the quasi-scientific in between. Most of the popular books on the subject are going into limbo, together with the bulk of the popular fiction of the day, and not even the British Museum will preserve them. They played their little part, and they pass away into the darkness.

CHAPTER XXVI

THE WAR AND AFTER

These somewhat casual chronicles really end with the outbreak of the Great War, for that event separated the early days of flying from the second stage. Critics will say there is no clear division, and they will also say that since the War there have been greater changes in flying than the transition from what I arbitrarily call the early days to the "second phase". They will, of course, be right; yet I think by the time I have finished what I set out to do the book will be big enough: too big, I fear. But in spite of that fear I would round the narrative off with a brief glance at the War as I saw it, and at the post-War developments of flying.

On August Bank Holiday, 1914, I attended the Flying Meeting at Hendon. Already the shadow of the great catastrophe was falling. The weather was fine, yet looking back to that dim-remembered day it seems to me the very sky was darkened. There was but a small attendance, although it is safe to say that following many successful week-end meetings some 50,000 people would have been present. The programme was carried out in a half-hearted way, and some of the French pilots had already left for their own country, whilst there were significant absentees from the British list. Wild rumours were eagerly discussed. The Government, it was said, had commandeered all the petrol; all the omnibuses of London were leaving for France, or about to leave; conscription; Great Britain would not fight, she would rather emulate Germany and tear up "a scrap of paper"; Great Britain would fight; and so on. Several incidents occurred, I remember, reflecting the burning question of the day. M. Salmet arrived on his Blériot on his way to France, and announced the prohibition of his flight by the Home Office, and the conjectured commandeering of his machine; and when M. Pierre Verrier landed from a flight across country he was promptly accosted by a police inspector and asked to give an account of himself. Later Mr. Lillywhite, Mr. Brock, and M. Louis Noel put up a very good show.

Mr. W. L. Brock and M. Louis Noel had been in rivalry for some time, the American consistently getting a little more speed out of the Henri Farman box-kite than Noel could on his machine of exactly the same type and date. In a race in which there were five or six competitors on that day Mr. Brock again was successful, and M. Noel thought it might be due to some trifling difference in the trim or condition of the machine. Accordingly a duel was arranged, the two pilots exchanging mounts. M. Noel carried me as passenger, and we went round and round the pylons in as keen a match as ever was flown. But although M. Noel's cornering was amazing, and we swept round the pylons with the left wing almost on the ground, the plane on a vertical bank, Mr. Brock again proved the best man, winning, I think, by about four seconds in a race of four laps. Of course, it was a mere nothing, but M. Noel laughingly admitted he was convinced.

Back in London that evening I was caught up in the crowd which marched to Buckingham Palace and did not disperse until the King came out on the balcony and acknowledged their greeting. A wonderful demonstration, for the crowd was not "Mafficking", it was in solemn mood, filled with a religious sense of national duty.

Only one aspect of aviation, of course, was visible, and that was the military aspect. Of necessity the seaplane race round Britain, which was to begin the following Monday, was postponed indefinitely. The flying of private aeroplanes in any part of the country, except in recognised aerodromes was, for obvious reasons, prohibited. The aeroplanes that would have taken part in the Round Britain race were the best that could be made, and were designed for hard work, and it was surely a consolation to the promoters of the race that their loss was the Empire's gain. They had all along insisted upon the importance to Great Britain of the seaplane, but even the most far-sighted could not have anticipated the serious work in store for those machines.

Going over the last articles I wrote before joining the Service I find notes on many matters it is interesting to recall. In one I wrote:

"The immediate effect of the war on flying in England has been the departure of the majority of our best-known flyers from Hendon, Brooklands, Shoreham, and other aerodromes for naval and military service. Some of them were in the Reserve of the Flying Corps or the Naval Air Service, and had to obey the mobilisation order; but many others volunteered and were accepted. Among the reserve men may be mentioned Mr. Sippe and Mr. Gordon Bell, both pilots of the first rank. Mr. Busteed, who formerly held a commission in the R.F.C., has been accepted for service by the Admiralty on account of his unequalled seaplane experience. Lieut. Collett, who had taken a position in Beardmore's aviation department, has now returned to the R.N.A.S. The following are those who have so far been accepted from among the large number of civilian flyers who have volunteered, D. Corbett-Wilson, R. Loraine, H. Barber, B. C. Hucks, F. W. Merriam, R. Carr, J. Valentine, Frank McClean, R. J. Lillywhite, A. E. Barr, J. E. Thornely, J. L. Hall, and G. M. Dyott. It has been a noteworthy feature of the majority of the applications that the candidates made no stipulation whatever, but offered their services for any work that needed to be done."

In the smoking-room of the Aero Club hung a list of the members, and to the names of close on 250 of them a tiny Union Jack was pinned. The names thus honoured were those of members on active service. Many of them were with the Royal Naval Air Service and the Royal Flying Corps, but at least 50 per cent. were serving with other arms. It was an unfamiliar, cheerless, and small company that one met at the Club those days; so many well-known figures were absent, and there was a complete cessation of civilian and sporting flying and the activity engendered by the big competitions and projects that were being discussed in the latter days of July.

Many members of the Club had responded to the Chairman's (Lord Tullibardine) suggestion that volunteers might offer their service through him, and I was proud to learn my own offer was the first received. Afterwards I wrote to the Admiralty and the War Office offering my services. I was considerably above recruiting age, and poor sight barred me from some activities. It was not until October that I was asked by the Admiralty to call with a view to being used in the lighter-than-air department, and I was given a commission as Sub-Lieutenant R.N.V.R. attached R.N.A.S., and was sent to London's first air defence station at the Crystal Palace where a spherical balloon was sent up daily to a height enabling the observer to see above the fog and to look out for Zeppelins. The section was armed with Martinis adapted for explosive bullets. At Christmas the officer commanding that section was transferred to other duties, and I succeeded him. We had many alarms, and on one occasion were officially " in action "—save the mark!

But I must resist the temptation to dwell on the comic side of the business; probably in no part of the country or in any service was there so much of the ridiculous. And surely one of the miracles of the war was the obstinacy with which the nation fought through that period, sloughed the absurdities, laughed at itself and trained in the face of a highly organised enemy, and eventually beat him. I had no sooner got my commission, by the way, than the War Office, through Colonel (now Air-Vice Marshall Sir) W. S. Brancker, then Director of Military Aeronautics, asked me to wait a while when they would avail themselves of my offer. I recall, too, that the day I went to fit on my uniform I saw the funeral of Lord Roberts at St. Paul's.

Nearly three months afterwards the War Office wrote to me again, suggesting that I should do some test flying for the Aeronautical Inspection Department!

From the first the airmen were looked down upon by the Navy. Sailors could not believe that anybody who was not a sailor was of any use at all. Even the R.N.V.R. disliked the air service, and I have no doubt from their point of view there was much to criticise. Much of this was harmless, but much of it was spiteful and disheartening.

By May the absurdity of our anti-aircraft measures was apparent to all, and I was transferred to Roehampton to give instruction in kite-ballooning and to give lectures on the theory of ballooning to officers destined for kite balloon work or for airships. This enabled me to do a little free ballooning, which was part of the course. After a year the Royal Naval Air Service was expanding at such a rate that instructors in the heavier-than-air division became urgently required, and I was transferred to this work, proceeding to the Crystal Palace, where I had to give many lectures daily on the theory of flight, on air navigation, on the principles of the aeroplane, on map reading, and other subjects; and in order to keep up with the hundreds of pupils who had been pushed out to aerodromes before they had been grounded in these subjects I had to visit R.N.A.S. flying schools, take classes, and hold examinations. There was little relief except an occasional flight, sometimes with an old pupil.

Later on the R.N.A.S. school was transferred to Greenwich Naval College, and I went with it, but not before I had paid a visit to Coudekerke, where there was a night-bombing squadron of two-engine machines. My visit had something to do with the behaviour of aircraft compasses. I had a few flights by day over the lines, and on one occasion took part in a night-bombing raid.

What I chiefly remember of all this period was the classroom filled with youngsters in naval uniform adorned by the gold eagle badge. Sometimes on course-finding exercises we used German maps of parts of Africa which before the War were under German dominion. There was something impressive in the spectacle of those rows of young Britons proudly wearing the eagle which marked them different from their brothers of the sea. After six weeks or so they went on to Eastbourne, to Redcar, to Chingford, or to a school in France; and now and again I would hear that this one or that had been killed, a victim to the intensive flight training then necessary. But some of them to-day are climbing in the Service; and more than one has become famous, either in the field or in flying exploits after the War.

Soon after the amalgamation of the two air services as the Royal Air Force I was transferred to No. 2 School of Aeronautics at Oxford University, and there I remained as Chief Instructor until the end.

One amusing incident early in the War, by the way, arose from the circumstance that in one of the Zeppelin raids a German airship officer, with whom I had become acquainted in peacetime, was captured. On being captured he made known the fact that he had a friend in England—not me, but the gentleman through whom I had become acquainted with him. Scotland Yard got busy, and it was found that the German officer had visited the Royal Aero Club with me on one occasion. Accordingly, I was sought out, and asked to give an account of what had occurred, for it was considered possible that the officer had been acting as a spy. The information I was able to give, supplementing that given by others, convinced them there was no case of that kind against the prisoner.

Great is the pity that Peace fails to maintain the spirit that prevailed during the war. Indeed, it seems almost that war is necessary to the human race in its present stage of development, and will be until the human heart is changed. Yet even in the Great War there was much of the sordid, and although I must refer to this I do so not because I imagine it was typical or universal, but because I know it was the exception. Many now dwell on this aspect and this alone, and would have us believe that because they can reveal baseness here and corruption there that all was base. Some of our novelists are grotesquely cynical, and would persuade the world that all men were foul and all women cheap. Unscientific twaddle all that. Yet some things rankle, and that because it may seem at a casual glance the world has not learned the lesson even now.

One of the aspects of the war that to this day makes for discontent in this country was the struggle and manœuvring on the one hand to get commissions, and on the other hand to avoid service of any kind. To that was added the misuse made of " conscientious objection ". Although it is the fashion to believe there will be no more war on the big scale I believe that no nation worthy of the name should have any other system than one which includes compulsory training for war, in which all citizens alike must in turn bear a share. There are no votes in it, alas! It is right, not on the ground merely of national safety, but because it would be the expression of true citizenship, and incidentally because it would save us from being the object of the despite of nations which are more advanced than we are in citizenship. French officers and men with whom I discussed this matter during the war were amazed at our backwardness, and offended by the spectacle of officers appointed not for knowledge and training, but as a reward of scheming. I could point the moral with specific instances, such as that of the youngster who seriously asked my advice to enable him to choose a branch of the service in which he would have a fair chance of surviving the war, because it was " rather important " in his case, " being an only son "! He was the heir to a glassbottle manufacturer, or something of the kind!

Surely, too, conscientious objection is spiritual pride in one of its basest forms; and surely, again, it takes an exaggerated view of the importance of our poor bodies and our mortal lives, as if these were all!

After the war began a period of great British effort in the air, and to this I must refer before laying down my pen. After all, the first phase cannot be closed without reference to the great pioneer flights. The first aeroplane flight across the Atlantic, that amazing, audacious, and (of course) foolhardy exploit of the late Sir John Alcock and Sir James Whitten Brown. Before the War, as we have seen, the trans-Atlantic flight was projected by several aviators. We may be sure that but for the War it would have taken place at least three years before 1919. Alcock and his companion crossed the Atlantic, a flight of about 1,900 miles, on a land machine. History cannot give a more remarkable instance of faith in a star.

Other great British exploits were the double crossing of the Atlantic by the R 34, the flight to Australia by the late Sir Ross Smith and his brother Sir Keith Smith, and the flight from Cairo to the Cape by Sir P. Van Ryneveld and Sir J. Q. Brand. In each case there were rivals for the honour. In one of the attempts to fly from Cairo to the Cape I took part, accompanying Major H. G. Brackley, Captain F. Tymms, Mr. Knight and

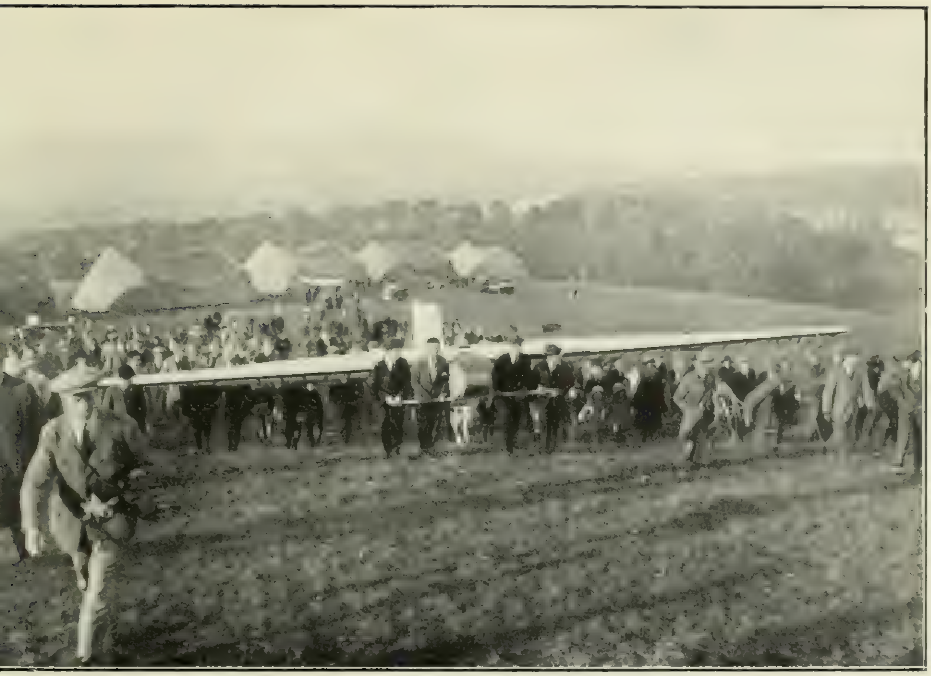
Mr. Banthorp on the attempt in a 0/400 Handley Page. We were going strong when, on the third day from Cairo, just as we had decided we might make Khartum in one flight from Assuan and were flying at a height of 8,000 feet, suddenly the tail began to rock violently, the centre of trouble apparently being about half-way along the fuselage. Brackley stopped the engines and the rocking ceased. He put them on gently, and it immediately resumed, and thereafter, although he immediately throttled down, it continued. He had no rudder control, and his aileron control was almost gone. Happily, he could operate the elevator. He had a heavy task in keeping the wheel in his hands. Thus we came down gliding for more than fifteen minutes, and in every second of that glide we expected the next would see the complete disintegration of the machine. Each of us was so convinced the end had come we were quietly resigned. But by a miracle the machine held together. Brackley, however, had been unable to steer into the wind and we touched sand and boulders with a big side drift, with the result that the machine was partially wrecked, finishing on one wing and with its tail sticking up well out of reach.

The atmosphere of the old flying days came back at the glider meeting at Itford, in Sussex, for then we found the pioneers again working on almost unknown problems, and in many instances with makeshift apparatus. This experiment had been prompted by the great successes of German gliders, for the Germans, debarred from experimenting with motor-driven aircraft, had bent their energies to the problems of "wind-flying". France also was going ahead in this field.

I would only recall the fact that Britain came rather late to this interesting experiment, and was the first to be discouraged out of it! There is still something to learn from gliding experiments, but there is "no money in it", and it means a hard life. Of course this country is a heavy sufferer through the War; but so was Germany, and so was France. Possibly the easy life is too easy of attainment in post-war England after all!

The glider meeting was followed by the development of the so-called "light aeroplane". In this department Great Britain has fully vindicated her aeronautical science and industry.

After the War the Royal Air Force inaugurated its annual Display for Service charities; and another mark of development was the institution of the King's Cup, in two races for which annual event I took part as a passenger. In the Army manœuvres in 1925 aircraft were used, not to the fullest possible extent, but



Glider Hangars at Itford, 1922.
Mr F. P. Raynham's Machine

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with a definite purpose. In previous Army exercises only a slight use had been made of aircraft. On this occasion there were "Air Umpires". In the capacity of Air Correspondent I had to follow the manœuvres just as the War Correspondents of the principal newspapers observed them from their point of view.

The old flying days were over to the regret, for one reason, of all who had part in them. Some who had struggled in adversity had become great employers of labour. Money was available for research; but time was not available; the pressing need overshadowing all others was to put machines and pilots into the air. Economical design and flying were minor considerations, and the class of machine developed was one in which performance was everything and commercial plausibility nothing. Whether the net result, as regards the development of flying, was good or ill is open to argument. If there had been no war it is possible the development of the civil flying machine would have been more sure. On the other hand, much was gained at the cost of extravagant outlay of money and lives; and lessons were learned. Undoubtedly the art of flying, and our familiarity with the air, gained from the fact that thousands of pilots were flying, and that their knowledge and experience became available for all.

Unfortunately, the war lasted a long time, and left the nation poor, and at the same time it saddled aeronautics with an immense burden of material which could be used up without the need to build anew. It is true the Air Ministry held a competition for commercial aircraft, but designers had become confined to a groove, and to a large extent the types produced were merely adapted war types.

After the war the question of the control of the air services came up, and it was claimed that a policy which may have been expedient in the war ought to be abandoned with the coming of peace, and that the Navy and the Army should each have its own air service as before the formation of the Air Ministry. There must, of course, be air units trained for co-operation with the fleet and the army, and with the good will of the older services this can be secured without friction. Without good will the best systems go awry.

The respective parties in the larger controversies and struggles carried their warfare into the journalistic field. Some of the methods were evidently adopted on the principle that the end justifies the means.

In 1920 I suggested a dinner to the Pioneers of British Aviation. I was then editing *Aeronautics*, and the proprietors of that journal immediately fell in with the idea and exerted their influence to make it a success. A Committee of hosts was called together, these being the Earl of Desborough, Major-General the Rt. Hon. J. E. B. Seely, Sir Herbert Austin, Sir Robert Hadfield, Sir Charles Wakefield, Sir Samuel Waring, Lord Montagu of Beaulieu, Lieut.-Colonel Sir Alan Burgoyne, and Mr. (now Sir) Ernest Benn (the head of the firm which produced *Aeronautics*). I give the list of guests because it groups the names of so many of the pioneers, and also indicates the then surviving holders of the first 100 flying certificates issued by the Royal Aero Club. These are marked by an asterisk. Many of the tables were arranged to bring together old associates. Thus there were Brooklands and Eastchurch tables, and so on.

The Duke of York (himself an officer in the R.A.F.) sat at the right hand of the Chairman (Major-General Seely). Right and left of the Chairman were: H.R.H. The Duke of York, Sir H. M. Trenchard, Lord Desborough, Lord Londonderry, Major-General Sir F. H. Sykes, Admiral of the Fleet Sir E. H. Seymour, Viscount Burnham, Lord Lee of Fareham, Captain Wedgwood Benn, Air Vice-Marshal Sir Godfrey M. Paine, Mr. J. L. Garvin, Lord Montagu of Beaulieu, Commander Sablé, Major Melvin Hall, Major-General Itami, Mr. H. G. Wells, Lieut.-Colonel Sir Alan Burgoyne, Major Carlo Graziani, Sir James Currie, Sir Robert Hadfield, Sir William Joynson-Hicks, Mr. E. J. P. Benn, Lieut.-Colonel. J. T. C. Moore-Brabazon, and Sir Samuel Waring.

The names with an asterisk are pilots in the first 100 British aviators. (Many of the others were also aviators or airship pilots).

Acland, Capt. H. E. P. D.
Adams, Mr. E. R.
Allen, Mr. Chas. V.
Aston, Capt. W. G., A.M.I.A.E., A.F.Ae.S.
Austin, Sir Herbert, K.B.E., M.P.

Bacon, Miss Gertrude
Baden-Powell, Major B., F.R.A.S., F.R.Met.S.
Bagnall-Wild, Brig.-Gen. R. K., C.M.G., C.B.E.
Bairstow, Prof. L., C.B.E., F.R.S.
Barnwell, Capt. F. S., F.Ae.S.

Barr, Mr. A. J. A. Wallace
Benn, Sir John, Bart.
Benn, Captain Wedgwood, D.S.O., D.F.C., M.P.
Bird, Squadron-Commander James, O.B.E., M.I.M.E.
*Blackburn, Wing-Commander H., M.C., A.F.C.
Blackburn, Mr. R.
Blake, Major W. T.
Blumenfeld, Mr. R.
*Board, Wing-Commander A. G., C.M.G., D.S.O.
*Bouwens, Mr. B. G.
*Boyle, Capt. the Hon. Alan R.
Brackley, Major H. G., D.S.O., D.S.C.
Bradshaw, Mr. Granville
Brand, Squadron-Leader Sir Quintin, D.S.O., D.F.C., M.C.
Brewer, Mr. Griffith, F.Ae.S.
Bright, Sir Charles, F.R.S.E., M.Inst.C.E., F.Ae.S.
Broke-Smith, Lieut.-Col. P., D.S.O., O.B.E.
Brooke-Popham, Air Commodore H. R. M., C.B., C.M.G., D.S.O., A.F.C.
Broome, Capt. F. C., D.F.C.
Bruce, Mr. R. A.
Buck, Major F. C.
*Busteed, Wing-Commander H. R., C.B.E., A.F.C.
Butler, Mr. Frank Hedges

Caddell, Major-General W. H.
Calthrop, Mr. E. R.
Cary, Mr. R. O.
Cates, Mr. John
Cattle, Mr. A. J.
Chalmers-Mitchell, Dr. M. A., D.Sc., LL.D.
Charteris, Capt. R. L.
Chereau, M. Norbert
Clarke, Mr. T. W. K., A.F.Ae.S.
Clayton-Kennedy, Major K. E.
Clerke, Major A. B. H.
Cochrane, Mr. William
Cockerell, Capt. S.
Coghlan, Sir T. A., Agent-General, N.S.W.
*Conway Jenkins, Brig.-General F., C.B.E.
Cook, Sir Theodore
Coppens, Chevalier Willy, D.S.O. (Belgian Air Attaché).

Dale, Mr. Martin
*Darroch, Mr. G. R. S.
Davenport, Mr. Arthur
*Davies, Mr. E. Keith, A.F.Ae.S.
*Dawes, Wing-Commander G. W. P., D.S.O., A.F.C.
*De Havilland, Capt. G., O.B.E., A.F.C.
Delacombe, Lieut.-Col. H., O.B.E.
*Dolphin, Flight-Lieut. W.
*Drexel, Mr. J. A.
Dunne, Major J. W., F.Ae.S.

*Ewen, Major W. H.

Fairey, Mr. C. R., A.F.Ae.S., M.B.E.
Fisher, Mr. Frank
Flanders, Mr. L. Howard, A.F.Ae.S., M.I.Ae.E. (Hons.)
Frost, Mr. Edward P.

*George, Mr. A. E.
Gnosspelius, Major Oscar, A.F.Ae.S.
*Gordon England, Mr. E. C., A.F.Ae.S.
*Grahame-White, Mr. Claude
Green, Mr. G.
*Greswell, Mr. C. H.
Grey, Mr. C. G.
Grey, Lieut.-Colonel Spenser, D.S.O.

Hammond, Mr. E. V.
Handasyde, Mr. G. H.
Handley Page, Mr. F., F.Ae.S.
Harbord, The Hon. Mrs. Assheton
Hawker, Mr. H. G.
Heckstall-Smith, Major S.
Hewlett, Mrs. Maurice
*Higgins, Group-Capt. T. C. R., C.M.G.
Higgins, Air Vice-Marshal J. F. A., C.B., D.S.O., A.F.C.
Hubbard, Squadron-Leader T. O'B., M.C., A.F.C.,
Huggins, Brig.-General A.
*Hynes, Wing-Commander G. B., D.S.O.

Isaac, Mr. Bernard
Isaacs, Mr. Godfrey
Johnson, Mr. Basil
Jullerot, Major H., A.F.C.

*Kemp, Mr. Ronald C.
Kerr, Rear-Admiral Mark, C.B., M.V.O., R.N.
Knox, Mr. Henry.

Lanchester, Mr. F. W., M.Inst., C.E.
Lang, Mr. A. Dashwood
Ledeboer, Major J. H., M.B.E.
Leslie, Flight-Lieut. Reginald
Lloyd, Col. F. Lindsay, C.M.G.
Lloyd, Mr. Herbert, A.F.Ae.S., M.I.A.E. (Hons.)
*Longmore, Group-Captain A., D.S.O., M.I.Ae.E.
*Loraine, Lieut.-Col. Robert, D.S.O., M.C.
Lord, Mr. John
*Low, Major A. R.

McCann, Mr. G.
*McClean, Lieut.-Col. F. K., A.F.C.
*Macfie, Mr. Robert F.
Maitland, Air-Commodore E. M., C.M.G., D.S.O., A.F.C.
Mander, Mr. Lionel H.
Manning, Mr. W. O., A.F.Ae.S., M.I.Ae.E. (Hons.)
Marsh, Lieut.-Col. W. Lockwood, A.F.Ae.S.
Martin, Mr. H. P.

May, Mr. Fred
Merriam, Capt. F., A.F.C.
*Morison, Capt. O.C.
Morris, Lord
Mort, Mr. J. Chester

Noel, Captain Louis
North, Mr. John D., F.Ae.S.

*Ogilvie, Lieut.-Col. Alec, C.B.E.
O'Gorman, Lieut.-Col. Mervyn, C.B., F.Ae.S.

Parrott, Mr. R. J.
*Paterson, Mr. C. Compton
*Pepper, Major J. W.
Percival, Mr. N. S.
Perrin, Mr. Harold E.
Petavel, Sir John E., F.Ae.S.
Petre, Major H., D.S.C.
*Pixton, Captain Cecil Howard
Prestwich, Mr. J. A.

*Raynham, Major F. P.
*Reynolds, Major H. R. P.
Richards, Mr. Geo. Tilghman, A.F.Ae.S., M.I.M.E., M.I.Ae.E.
*Roe, Mr. A. V.
Roe, Mr. H. V.
Roger, Sir Alexander
Rolls, Capt. Sir John Shelley, Bart.

Salmond, Air Vice-Marshal Sir John M., K.C.B., C.M.G., C.V.O., D.S.O.
*Samson, Group-Captain C. R., C.M.G., D.S.O., A.F.C., R.A.F.
*Sassoon, Mr. E. V.
Savage, Major J., O.B.E.
Sayers, Capt. W. H., M.I.Ae.E. (Hons.)
Scott, Mr. C. J. Fairfax, M.A.
Scott, Group-Capt. A. J. C., C.B., M.C., A.F.C.
Scott-Paine, Mr. Hubert
Searight, Major T. P.
*Sebag-Montefiore, Major T. H., D.S.O., M.C.
Seymour, Admiral of the Fleet, The Rt. Hon. Sir E. H.
Shaw, Capt. W. R. Douglas, M.I.Ae.E.
Shaw, Sir Napier, F.Ae.S.
Short, Mr. Eustace
Short, Mr. Oswald
Sigrist, Mr. F.
*Singer, Sir Mortimer, K.B.E.
Sippe, Major S. V., O.B.E., D.S.O.
*Somerset, Mr. Somers
*Sopwith, Mr. T. O. M., A.F.Ae.S.
Spencer, Mr. Herbert
Spooner, Mr. Stanley
Spottiswoode, Mr. J. H.
Stanton, Dr. T. E.

Stevenson, Mr. B.
Stone, Mr. Geoffrey de Holden
Swinton, Brig.-General E. D., C.B., D.S.O.

Templer, Col. James
*Thomas, Mr. Herbert J.
Thomas, Mr. Holt
Thorburn, Mr. Douglas W.
Thurston, Dr. A. P., F.Ae.S., D.Sc.
*Travers, Lieut.-Col. J. L., C.B.E.
*Turner, Major C. C., A.F.Ae.S., M.I.Ae.E. (Hons.)
*Turner, Mr. Lewis F.

Vane, Mr. H. T.
Volk, Mr. M. H.
Vyvyan, Air Vice-Marshal, C.B., D.S.O.

Wakefield, Sir C., Bart.
Wallace, Mr. R. W., K.C.
Walmsley, Mr. E. Mullineux
*Watkins, Capt. H. E.
White, Sir Stanley, Bart.
White-Smith, Mr. H., C.B.E.
Whittaker, Major W. E. de B.
*Wickham, Capt. R. F.
Wildeblood, Capt. H. S.
Williams, Mr. E. T.
Windham, Lieut.-Commander W., R.N.
Wright, Mr. Howard T., A.F.Ae.S.

Messages regretting inability to be present were received from Lord Weir and Brigadier-General J. G. Weir (on account of the death of their father); Major-General Sir R. M. Ruck (on account of the death of his sister); Sir R. T. Glazebrook, Major J. B. Fowler, Mr. Archibald Knight, Mr. Ridley Prentice, all of whom were too ill to attend. Others prevented were Lord Sydenham, the Rt. Hon. Andrew Fisher, Mr. H. Barber, Mr. W. E. McArdle, Lieut.-Colonel John Dunville, Mr. Baldwin Raper, M.P., and Brigadier-General Sir Capel Holden.

THE END

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